

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF TEXAS
TEXARKANA DIVISION

OPTIMORPHIX, INC.,

Plaintiff,

v.

AMAZON.COM, INC.; AMAZON.COM
SERVICES LLC; AND AMAZON WEB
SERVICES, INC.,

Defendants.

Civil Action No. 5:23-cv-00123-RWS-JBB

JURY TRIAL DEMANDED

FIRST AMENDED COMPLAINT FOR PATENT INFRINGEMENT

OptiMorphix, Inc. (“OptiMorphix” or “Plaintiff”) brings this action and makes the following allegations of patent infringement relating to U.S. Patent Nos.: 7,099,273 (the “273 patent”); 7,444,418 (the “418 patent”); 7,031,314 (the “314 patent”); 7,136,353 (the “353 patent”); 7,586,871 (the “871 patent”); 7,616,559 (the “559 patent”); 7,987,285 (the “285 patent”); 8,230,105 (the “105 patent”); 8,255,551 (the “551 patent”); 10,412,388 (the “388 patent”); 9,167,021 (the “021 patent”); and 10,362,081 (the “081 patent”) (collectively, the “patents-in-suit”). Defendants Amazon.com, Inc.; Amazon.com Services LLC; and Amazon Web Services, Inc. (collectively, “Amazon” or “Defendant”) infringe the patents-in-suit in violation of the patent laws of the United States of America, 35 U.S.C. § 1 *et seq.*

THE PARTIES

1. Plaintiff OptiMorphix, Inc. (“Plaintiff” or “OptiMorphix”) is a Delaware corporation that holds a portfolio of over 250 patent assets that were developed at Citrix Systems, Inc. (“Citrix”) and Bytemobile, Inc.

2. Bytemobile, Inc. (“Bytemobile”) was a global leader in mobile internet solutions for network operators. The company was founded in 2000. Bytemobile’s mission was to optimize

video and web content services for mobile network operators to improve users' experiences while maximizing the efficiency of network infrastructure.

3. Bytemobile was established during a time when the mobile landscape was evolving rapidly. The advent of 3G technology, coupled with increasingly sophisticated smartphones, led to a surge in demand for data services. However, mobile networks at the time were not optimized to handle this influx, particularly for data-rich services like video streaming. Recognizing this opportunity, Bytemobile sought to create solutions that would enable network operators to deliver high-quality, consistent mobile data services. By 2011, Bytemobile was a "market leader in video and web optimization, with more than 125 cumulative operator deployments in 60 countries."¹



Andrew Zipern, *Vodafone in Deal with Start-Up Bytemobile*, NYTimes at C4 (January 29, 2002) ("Bytemobile, a wireless data start-up . . . reached a deal with Vodafone, Britain's largest mobile phone operator"); *NTT DoCoMo Launches Bytemobile Optimization Solution in its Core Network*, WIRELESSWATCH IP (October 5, 2004) ("NTT DoCoMo has deployed Bytemobile's optimization solution in its core network"); *China Mobile Selects Bytemobile for Nationwide Web Gateway Project*, BUSINESS WIRE (July 8, 2009) ("A Bytemobile customer since 2004, CMCC has deployed its web optimization solutions"); *Bytemobile Juices Up Orange*, ESPICOM TELECOMMUNICATION

¹ *Bytemobile: Importance of Video and Web Optimizations*, TELECOM REVIEW at 58 (2011); see also *Bytemobile Secures Its 36th Video Optimisation Win for MNO Deployment*, TOTAL TELECOM & TOTAL TELECOM MAGAZINE (March 21, 2011).

NEWS (October 10, 2002) (“Orange customers will experience faster application performance and Web page downloads”); *ByteMobile Wins 2013 LTE Award for Best LTE Traffic Management Product*, MARKETSCREENER (July 1, 2013) (“ByteMobile technology has been deployed . . . in networks serving nearly two billion subscribers.”).

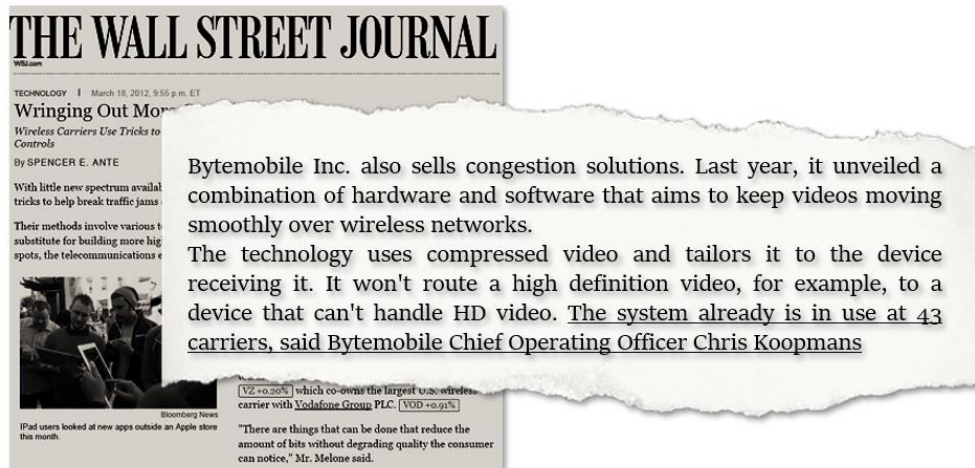
4. Bytemobile products, such as the Unison platform and the T3100 Adaptive Traffic Manager, were designed to optimize mobile data traffic in real-time, ensuring a high-quality mobile internet experience for end-users. This approach was groundbreaking at the time and set the stage for many of the mobile data optimization techniques used today.

5. Bytemobile’s innovative technologies and customer-centric approach led to rapid growth and success. Bytemobile’s innovative product portfolio included: the T3100 Adaptive Traffic Manager which was designed to handle high volumes of traffic efficiently and provide real-time optimization, compression, and management of mobile data; Bytemobile’s T2000 Series Video Cache, which supported transparent caching of content; and Bytemobile’s T1000 Series Traffic Director, which enabled traffic steering and load balancing for high availability of applications.



ByteMobile Adaptive Traffic Management Product Family, BYTEMOBILE DATA SHEET at 1-2 (2014).

6. Bytemobile's groundbreaking technologies also included products for data optimization. Bytemobile's data optimization solutions were designed to compress and accelerate data transfer. By reducing the size of data packets without compromising quality, these technologies allowed faster data transmission and minimized network congestion. Bytemobile also offered solutions to analyze and manage network traffic, allowing network operators to identify patterns, allocate bandwidth intelligently, and prioritize different types of content.



Spencer E. Ante, *Wringing Out More Capacity*, WALL STREET JOURNAL at B3 (March 19, 2012) (emphasis added).

7. In July 2012, Bytemobile was acquired by Citrix Systems, Inc. ("Citrix") for \$435 million. Bytemobile "became part of [Citrix's] Enterprise division and extend[ed] [Citrix's] industry reach into the mobile and cloud markets."²

8. OptiMorphix owns a portfolio of patents developed at Bytemobile and later Citrix. Highlighting the importance of the patents-in-suit is the fact that the OptiMorphix's patent portfolio has been cited by over 4,800 U.S. and international patents and patent applications assigned to a wide variety of the largest companies operating in the networking, content delivery, and cloud computing fields. OptiMorphix's patents have been cited by companies such as:

² CITRIX SYSTEMS, INC. 2012 ANNUAL REPORT at 33 (2013).

- *Amazon.com, Inc. (263 citing patents and applications)*³
- Oracle (59 citing patents and applications)⁴
- Alphabet, Inc. (103 citing patents and applications)⁵
- Broadcom Ltd. (93 citing patents and applications)⁶
- Cisco Systems, Inc. (277 citing patents and applications)⁷
- Lumen Technologies, Inc. (77 citing patents and applications)⁸
- Intel Corporation (45 citing patents and applications)⁹
- Microsoft Corporation (150 citing patents and applications)¹⁰
- AT&T, Inc. (93 citing patents and applications)¹¹
- Verizon Communications, Inc. (31 citing patents and applications)¹²
- Juniper Networks, Inc. (29 citing patents and applications)¹³

9. Defendant Amazon.com, Inc. is a Delaware corporation with its principal place of business at 410 Terry Avenue North, Seattle, Washington 98109. Amazon.com, Inc. may be may be served through its registered agent Corporation Service Company, 251 Little Falls Drive, Wilmington, Delaware 19808. “Amazon.com, Inc. sells its products through its internet distribution network” *Trackthings LLC v. Amazon.com, Inc.*, Case No. 6:21-cv-00720-ADA, Dkt. No. 59 at 1 n.1 (W.D. Tex. May 4, 2022) (Amazon.com, Inc. quoting *Nazomi Commc’ns, Inc. v. Nokia Corp.*, 2010 WL 11509140, at *1-2 (C.D. Cal. Oct. 12, 2010)). Amazon.com, Inc. employs thousands of employees and has numerous offices and facilities. Amazon.com, Inc. operates this internet distribution network and sells its products within this District.

10. Defendant Amazon.com Services LLC is a Delaware limited liability company with its principal place of business at 410 Terry Avenue North, Seattle, Washington 98109.

³ See e.g., U.S. Patent Nos. 7,817,563; 9,384,204; 9,462,019; 11,343,551; and 11,394,620.

⁴ See e.g., U.S. Patent Nos. 7,475,402; 7,574,710; 8,589,610; 8,635,185; and 11,200,240.

⁵ See e.g., U.S. Patent Nos. 7,743,003; 8,458,327; 9,166,864; 9,665,617; and 10,733,376.

⁶ See e.g., U.S. Patent Nos. 7,636,323; 8,448,214; 9,083,986; 9,357,269; and 10,091,528.

⁷ See e.g., U.S. Patent Nos. 7,656,800; 7,930,734; 8,339,954; 9,350,822; and 10,284,484.

⁸ See e.g., U.S. Patent Nos. 7,519,353; 8,315,179; 8,989,002; 10,511,533; and 11,233,740.

⁹ See e.g., U.S. Patent Nos. 7,394,809; 7,408,932; 9,515,942; 9,923,821; and 10,644,961.

¹⁰ See e.g., U.S. Patent Nos. 8,248,944; 9,071,841; 9,852,118; 10,452,748; and 11,055,47.

¹¹ See e.g., U.S. Patent Nos. 8,065,374; 8,429,302; 9,558,293; 9,800,638; and 10,491,645.

¹² See e.g., U.S. Patent Nos. 8,149,706; 8,930,559; 9,253,231; 10,003,697; and 10,193,942.

¹³ See e.g., U.S. Patent Nos. 8,112,800; 8,509,071; 8,948,174; 9,407,726; and 11,228,631.

Amazon.com Services LLC is a wholly-owned subsidiary of Amazon.com, Inc. Amazon.com Services LLC is registered to do business in the State of Texas and may be served with process via its registered agent in Texas, Corporation Service Company d/b/a CSC-Lawyers Incorporating Service Company at 211 7th Street, Suite 620, Austin, Texas 78701. Amazon.com Services LLC is “[t]he entity that owns and operates the Amazon.com website.” Dkt. No. 15 at 3. Amazon.com Services LLC also leases and operates the Amazon FTW3/FTW4 and STX8 fulfillment centers located within this District. Dkt. No. 15 at 7.

11. Defendant Amazon Web Services, Inc. (“AWS”) is a Delaware corporation with its principal place of business at 410 Terry Avenue North, Seattle, Washington 98109. Amazon Web Services, Inc. is a wholly-owned subsidiary of Amazon.com, Inc. Amazon Web Services, Inc. may be served through its registered agent Corporation Service Company, 251 Little Falls Drive, Wilmington, Delaware 19808.

12. Amazon.com, Inc. is the parent company of Amazon.com Services LLC and Amazon Web Services, Inc. Amazon.com, Inc.; Amazon.com Services LLC; and Amazon Web Services, Inc. are collectively referred to herein as “Amazon.”

13. Amazon conducts business operations within the Eastern District of Texas.

14. Amazon has a regular and established place of business in this District, including, for example, its Amazon Robotics Fulfillment Center FTW3/FTW4 located at 15201 Heritage Parkway, Fort Worth, Texas 76177 and at the Sub-Same Day Fulfillment Center STX8 located at 3501 Research Drive, Richardson, TX 75082.

JURISDICTION AND VENUE

15. This action arises under the patent laws of the United States, Title 35 of the United States Code. Accordingly, this Court has exclusive subject matter jurisdiction over this action under 28 U.S.C. §§ 1331 and 1338(a).

16. This Court has personal jurisdiction over Amazon in this action because Amazon has committed acts within the Eastern District of Texas giving rise to this action and has established minimum contacts with this forum such that the exercise of jurisdiction over Amazon would not offend traditional notions of fair play and substantial justice. Defendant Amazon, directly and/or through subsidiaries or intermediaries (including distributors, retailers, and others), has committed and continues to commit acts of infringement in this District by, among other things, offering to sell and selling products and/or services that infringe the patents-in-suit. Moreover, Amazon has offices and facilities in the State of Texas, and actively directs its activities to customers located in the State of Texas.

17. Amazon is subject to this Court's general and specific jurisdiction pursuant to due process and/or the Texas Long Arm Statute due at least to Amazon's substantial business in the State of Texas and in this District, including through employing more than 89,000 full- and part-time employees (as of January 2024) at 50 fulfillment and sortation centers, 33 delivery stations, an Air Gateway, 36 Whole Foods Market locations, 3 Amazon Hub Locker+ locations, 6 Prime Now fulfillment centers, an Amazon Pharmacy, a Prime Air drone delivery center, 3 wind farms, 13 solar farms, 7 On-site solar locations, and an Amazon Original series filmed in the State of Texas: Panic.¹⁴

18. Venue is proper in this District under 28 U.S.C. §§ 1391(b)-(d) and 1400(b). Defendant Amazon is registered to do business in the State of Texas, has offices in the State of Texas, has transacted business in the Eastern District of Texas and has committed acts of direct and indirect infringement in the Eastern District of Texas.

¹⁴ *Investing in the U.S.*, ABOUTAMAZON.COM WEBSITE (last visited February 5, 2024), available at: <https://www.aboutamazon.com/investing-in-the-u-s>.

19. Amazon has a regular and established place of business in this District and has committed acts of infringement in this District, including but not limited to: 15201 Heritage Parkway, Fort Worth, Texas 76177; 1101-1107 E 15th St, Plano, Texas 75074; 1809 W. Frankford Rd, Suite 160, Carrollton, Texas; 4800 Henrietta Creek Rd, Fort Worth, Texas; and 3501 Research Drive, Richardson, Texas 75082; 16399 Gateway Path, Frisco, Texas 75033; 1398 Industrial Blvd McKinney, Texas 75069; 3701 Litsey Rd, Fort Worth, Texas 76177; 4121 International Pkwy Carrollton, Texas 75007-1907; and 1303 Ridgeview Dr DDF1 Lewisville, Texas 75057.

20. Amazon has also committed acts of infringement in this District by commercializing, marketing, selling, distributing, testing, and servicing the Accused Products identified herein.

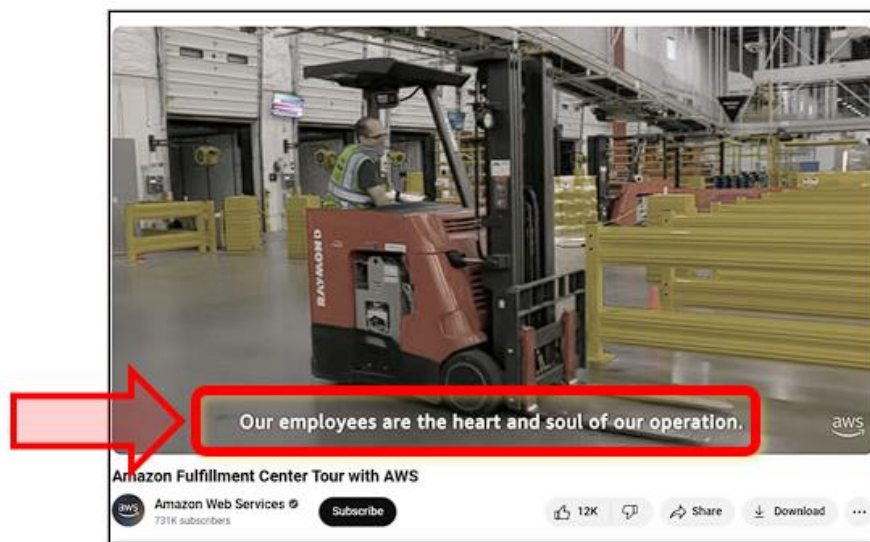


AMAZON FTW3 & FTW4 FULFILLMENT CENTERS (This Amazon location is located at 15201 Heritage Parkway, Fort Worth, Texas 76177 in the Eastern District of Texas).

21. Amazon Web Services, Inc. (“AWS”) operates its business from Amazon’s Robotic Fulfillment Centers located within this District, including the FTW3/FTW4 fulfillment center

pictured above located at 15201 Heritage Parkway. See *Amazon Fulfillment Center Tour with AWS*, AMAZON YOUTUBE CHANNEL, available at: <https://www.youtube.com/watch?v=8nKPC-WmLjU> (last visited Feb. 16, 2024) (“Amazon’s Fulfillment Centers are wonders of automation, with AWS at their core.”). AWS describes the Amazon Fulfillment Centers as “a symphony of people, AWS, software, and other high-tech components. The result is a coordination between *our great employees* and the finely-honed computer systems we’ve evolved for more than 20 years.” *Id.* at 1:21 (emphasis added).

22. AWS publicly represents that AWS holds Amazon Fulfillment Center Associates are AWS employees that are conducting the business of AWS.



Amazon Fulfillment Center Tour with AWS, AMAZON YOUTUBE CHANNEL, available at: <https://www.youtube.com/watch?v=8nKPC-WmLjU> at 1:36 (last visited Feb. 16, 2024) (emphasis added).

23. In addition to performing core functions of sorting, packing, and shipping products ordered through the Amazon.com website, Fulfillment Center Associates (*i.e.*, AWS employees or agents) actively participate in the operation and improvement of AWS products. For example, when AWS’s Machine Learning model has “low confidence” in the classification of a product, “[i]t sends images to people to classify and train more ground truth data for [AWS’s] Machine

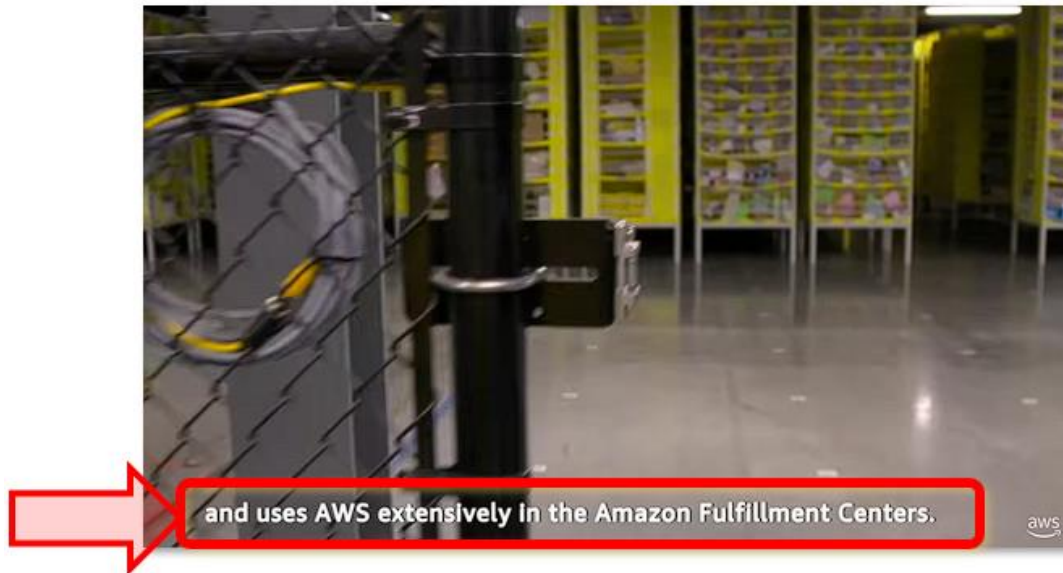
Learning model, which operates in Amazon Sagemaker and Amazon Sagemaker Ground Truth *from AWS.*” *Id.* at 4:20.

24. AWS explains that its SageMaker platform “is a fully managed service” that utilizes “human-in-the-loop capabilities” to “[h]arness the power of human feedback across the ML [machine learning] lifecycle to improve the accuracy and relevancy of FMs [foundation models].” *Amazon SageMaker*, AWS WEBSITE, available at: <https://aws.amazon.com/sagemaker/> (last visited Feb. 16, 2024). Amazon Fulfillment Center Associates fill the “human-in-the-loop” role of providing feedback to the SageMaker platform to improve the accuracy and relevancy of AWS’s foundation models.



Amazon Fulfillment Center Tour with AWS, AMAZON YOUTUBE CHANNEL, available at: <https://www.youtube.com/watch?v=8nKPC-WmLjU> at 4:57 (last visited Feb. 16, 2024) (emphasis added).

25. The majority of the square footage (“about 65% of the facility’s total square footage”) of Amazon Fulfillment Centers are dedicated to robots that operate using AWS’s “own created robotic operating software.” *Id.* at 5:18. The Amazon Robotics team has developed “more than a hundred services to support operations and *uses AWS extensively in the Amazon Fulfillment Centers.*”



Amazon Fulfillment Center Tour with AWS, AMAZON YOUTUBE CHANNEL, available at: <https://www.youtube.com/watch?v=8nKPC-WmLjU> at 5:20 (last visited Feb. 16, 2024) (emphasis added).

26. Amazon's Fulfillment Centers, including the FTW3/FTW4 Robotic Fulfillment Centers located in this District utilize several AWS services and products, including but not limited to Amazon Aurora; Amazon Monitron; robotics operating software; Amazon SageMaker; and Industrial Data Fabric.

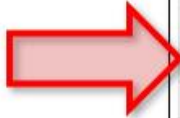
27. AWS relies on both AWS employees as well as Amazon Fulfillment Center Associates employed by other affiliated subsidiaries of Amazon.com, Inc. who work as agents of AWS to perform the business of AWS from within the Amazon Fulfillment Centers and Amazon locations within the district. AWS is integral to the successful operation of Amazon's Fulfillment Centers, including but not limited to the FTW3/FTW4 Fulfillment Centers. *See AWS for Industrial, AWS WEBSITE, available at: <https://aws.amazon.com/industrial/> (last visited Feb. 16, 2024) ("Amazon Fulfillment Centers are wonders of innovation and industrial automation. See how robotics, miles of conveyors, complex scanning & sortation equipment, advanced automation*

and machine learning come together with the help of AWS to get packages to customers in as fast as one day for Prime members.”).



Amazon Fulfillment Center Tour with AWS, AMAZON YOUTUBE CHANNEL, available at: <https://www.youtube.com/watch?v=8nKPC-WmLjU> at 5:20 (last visited Feb. 16, 2024) (emphasis added).

28. AWS maintains a regular and established place of business at 1649 West Frankford Rd., Carrollton, Texas 75007. At this location AWS maintains an “AWS Local Zone.” An AWS Local Zone is a physical presence that includes AWS hardware in a specific demarcated area along with AWS employees that oversee the hardware. Amazon’s own documentation describes an AWS Local Zone thus, “A Local Zone is an extension of an AWS Region in geographic proximity to your users. Local Zones have their own connections to the internet and support AWS Direct Connect, so that resources created in a Local Zone can serve applications that require low latency.” *How Local Zones Work*, AWS WEBSITE, available at: <https://docs.aws.amazon.com/local-zones/latest/ug/how-local-zones-work.html> (last visited February 15, 2024).



Local Zone Name	Local Zone Code	Local Zone ID	Network Border Group
	bkk-1a	az1	bkk-1
US East (Atlanta)	us-east-1-atl-1a	use1-atl1-az1	us-east-1-atl-1
US East (Boston)	us-east-1-bos-1a	use1-bos1-az1	us-east-1-bos-1
US East (Chicago) 2	us-east-1-chi-2a	use1-chi2-az1	us-east-1-chi-2
US East (Chicago)*	us-east-1-chi-1a	use1-chi1-az1	us-east-1-chi-1
US East (Dallas) 2	us-east-1-dfw-2a	use1-dfw2-az1	us-east-1-dfw-2
US East (Dallas)*	us-east-1-dfw-1a	use1-dfw1-az1	us-east-1-dfw-1
US East (Houston) 2	us-east-1-iah-2a	use1-iah2-az1	us-east-1-iah-2
US East (Houston)*	us-east-1-iah-1a	use1-iah1-az1	us-east-1-iah-1
US East (Kansas City 2)	us-east-1-mci-1a	use1-mci2-az1	us-east-1-mci-1
US East (Miami)	us-east-1-mia-1a	use1-mia1-az1	us-east-1-mia-1
US East (Minneapolis)	us-east-1-msp-1a	use1-msp1-az1	us-east-1-msp-1
US East (New York City)	us-east-1-nyc-1a	use1-nyc1-az1	us-east-1-nyc-1

AWS Local Zones User Guide, AWS WEBSITE, available at: <https://docs.aws.amazon.com/local-zones/latest/ug/available-local-zones.html> (last visited February 15, 2024).

29. This Court has personal jurisdiction over Amazon. Amazon has conducted and continues to conduct business within the State of Texas. Amazon, directly or through subsidiaries or intermediaries (including distributors, retailers, and others), ships, distributes, makes, uses, offers for sale, sells, imports, and/or advertises (including by providing an interactive web page) its products and/or services in the United States and the Eastern District of Texas and/or contributes to and actively induces its customers to ship, distribute, make, use, offer for sale, sell, import, and/or advertise (including the provision of an interactive web page) infringing products and/or services in the United States and the Eastern District of Texas. Amazon, directly and through subsidiaries or intermediaries (including distributors, retailers, and others), has purposefully and voluntarily placed one or more of its infringing products and/or services, as described below, into the stream of commerce with the expectation that those products will be purchased and used by customers and/or consumers in the Eastern District of Texas. These infringing products and/or services have been and continue to be made, used, sold, offered for sale, purchased, and/or

imported by customers and/or consumers in the Eastern District of Texas. Amazon has committed acts of patent infringement within the Eastern District of Texas. Amazon interacts with customers in Texas, including through visits to customer sites in Texas. Through these interactions and visits, Amazon directly infringes the patents-in-suit. Amazon also interacts with customers who sell the Accused Products into Texas, knowing that these customers will sell the Accused Products into Texas, either directly or through intermediaries.

30. Amazon has minimum contacts with this District such that the maintenance of this action within this District would not offend traditional notions of fair play and substantial justice. Thus, the Court therefore has both general and specific personal jurisdiction over Amazon.

THE ASSERTED PATENTS

U.S. PATENT NO. 7,099,273

31. U.S. Patent No. 7,099,273 (the “‘273 patent”) entitled, *Data Transport Acceleration and Management Within a Network Communication System*, was filed on January 29, 2002. The ‘273 patent is subject to a 35 U.S.C. § 154(b) term extension of 1,021 days. The ‘273 patent claims priority to U.S. Provisional Patent Application No. 60/309,212 filed on July 31, 2001, and U.S. Provisional Patent Application No. 60/283,542 filed on April 12, 2001. A true and correct copy of the ‘273 patent is attached hereto as Exhibit 1.

32. The ‘273 patent has been in full force and effect since its issuance. OptiMorphix, Inc. owns by assignment the entire right, title, and interest in and to the ‘273 patent.

33. The technologies disclosed in the ‘273 patent improve the efficiency and speed of data transmission within network communication systems. The ‘273 patent introduces methods and apparatuses that enhance data transport, especially in environments where network conditions

are variable or unpredictable and “provide systems and method for data transport acceleration and management within a network communication system.” ‘273 patent, col. 3:31-33.

34. The ‘273 patent is directed to solving the problem of inefficient data transport within network communication systems. This inefficiency can lead to poor utilization of network resources, increased latency, and reduced overall performance.

35. The ‘273 patent identifies the shortcomings of the prior art. Specifically, the specification describes that traditional methods of data transport in network communication systems often fail to efficiently manage and accelerate data transport, especially in environments with variable or unpredictable network conditions. These methods may not adequately handle network congestion, leading to poor utilization of network resources, increased latency, and reduced overall performance. “This bursty nature of data transmission may under-utilize the available bandwidth on the downlink channel, and may cause some applications requiring a steady flow of data, such as audio or video, to experience unusually poor performance.” ‘273 patent, col. 2:1-6.

36. The ‘273 patent identifies several shortcomings of the prior art, particularly in the context of the Transport Control Protocol (TCP) which is commonly used in modern data communication networks. The patent specification describes that:

Many of the problems associated with conventional TCP architectures stem from the flow control, congestion control and error recovery mechanisms used to control transmission of data over a communication network.

‘273 patent, col. 1:38-41.

37. Conventional TCP architectures assume that the network employs symmetric communication channels that enable data packets and acknowledgements to be equally spaced in time. This assumption often does not hold true in networks that employ asymmetric uplink and downlink channels, such as wireless communication networks. Bursty data transmission might

result in the inefficient use of the available bandwidth on the downlink channel, leading to suboptimal performance in applications that need a consistent data flow, such as those involving audio or video.

38. Another shortcoming identified is that conventional TCP architectures react to both random loss and network congestion by significantly and repeatedly reducing the congestion window, which can lead to significant and potentially unjustified deterioration in data throughput. This is particularly problematic in wireless and other bandwidth constrained networks where random packet loss due to fading, temporary degradation in signal quality, signal handoffs or large propagation delays occur with relatively high frequency.

39. The '273 patent also points out that conventional TCP congestion control mechanisms tend to exhibit sub-optimal performance during initialization of data connections over reduced-bandwidth channels, such as wireless links. When a connection is initiated, the congestion control mechanism aggressively increases the size of the congestion window until it senses a data packet loss. This process may adversely impact other connections that share the same reduced-bandwidth channel as the connection being initialized attempts to maximize its data throughput without regard of the other pre-existing connections. This can lead to inefficient use of resources with decreased overall throughput.

40. The '273 patent teaches the use of various techniques to accelerate and manage data transport in network communication systems. These techniques include the use of congestion control mechanisms, timers, and other methods to optimize data transmission. By implementing these techniques, the patent aims to improve the efficiency of data transport, particularly in environments with variable or unpredictable network conditions. This can lead to better utilization of network resources, reduced latency, and improved overall performance. The inventions

disclosed in the ‘273 patent provide significant benefits and improvements to the function of the hardware in a computer network.

41. The ‘273 patent family has been cited by 1,466 United States and international patents and patent applications as relevant prior art. Specifically, patents issued to the following companies and research institutions have cited the ‘273 patent family as relevant prior art:

- Cisco Technology, Inc.
- Qualcomm Incorporated
- International Business Machines Corporation
- Intel Corporation
- Microsoft Corporation
- Broadcom Corporation
- Google Inc.
- F5 Networks, Inc.
- Adobe Systems Incorporated
- Apple Inc.
- Lumen Technologies, Inc
- Oracle Corporation
- Amazon.com, Inc.

U.S. PATENT NO. 7,444,418

42. U.S. Patent No. 7,444,418 (the “‘418 patent”) entitled, *Transcoding Multimedia Information Within a Network Communication System*, was filed on May 9, 2002. The ‘418 patent claims priority to Provisional Application No. 60/290,269, which was filed on May 11, 2001. The ‘418 patent is subject to a 35 U.S.C. § 154(b) term extension of 766 days. A true and correct copy of the ‘418 patent is attached hereto as Exhibit 2.

43. The ‘418 patent has been in full force and effect since its issuance. OptiMorphix, Inc. owns by assignment the entire right, title, and interest in and to the ‘418 patent.

44. The ‘418 patent describes a method for transcoding multimedia information, which involves intercepting the multimedia data transmitted between a sender and a receiver. “Embodiments of the present invention alleviate many of the foregoing problems by providing

systems and methods for transcoding multimedia information within a network communications system.” ‘418 patent, col. 2:45-48.

45. The ‘418 patent is directed to solving the problem of transmitting multimedia information over network communication systems, particularly in scenarios where the transmission rate at which the multimedia information is encoded is greater than the available transmission rate. “As a result, these bandwidth constrained networks are susceptible to a mismatch between the required transmission rate of the multimedia information and the available transmission rate of the communication channel.” ‘418 patent, col. 1:56-60. This problem is especially pronounced in wireless and other bandwidth-constrained networks, which have physical limitations on the maximum bandwidth that the communication channel can support.

46. The inventions disclosed in the ‘418 patent provide significant benefits and improvements to the function of the hardware in a computer network by enabling more efficient transmission of multimedia information. By transcoding the multimedia information to match the available transmission rate of the downlink channel, the ‘418 patent teaches methods that prevent the receiver from being overloaded with data transmitted at a rate higher than it can handle. This can help to prevent disruptions and degradation in the performance of multimedia applications, leading to a better functioning of computer hardware.

47. The ‘418 patent family has been cited by 166 United States and international patents and patent applications as relevant prior art. Specifically, patents issued to the following companies and research institutions have cited the ‘418 patent family as relevant prior art:

- Apple, Inc.
- Verizon Communications Inc.
- Siemens Ag
- Microsoft Corporation
- Cisco Systems, Inc.
- Alphabet Inc.

- *Amazon.com, Inc.*
- Broadcom Limited
- Qualcomm, Inc.
- Koninklijke Philips Nv

U.S. PATENT NO. 7,031,314

48. U.S. Patent No. 7,031,314 (the “‘314 patent”) entitled, *Systems and Methods for Providing Differentiated Services Within a Network Communication System*, was filed on April 19, 2002. The ‘314 patent claims priority to U.S. Provisional Patent Application No. 60/291,918, which was filed on May 16, 2001, and U.S. Provisional Patent Application No. 60/309,213 filed on July 31, 2001. The ‘314 patent is subject to a 35 U.S.C. § 154(b) term extension of 625 days. A true and correct copy of the ‘314 patent is attached hereto as Exhibit 3.

49. The ‘314 patent has been in full force and effect since its issuance. OptiMorphix, Inc. owns by assignment the entire right, title, and interest in and to the ‘314 patent.

50. The ‘314 patent is directed to solving the problem of deploying differentiated services within existing network infrastructure. The patent identifies that existing network infrastructure was generally not designed to support a wide variety of application-specific and subscriber-specific services as the corresponding data flowed through a network. “Consequently, the different and potentially incompatible requirements of the increasingly diverse applications, Subscribers and networking environments has placed demands on the existing network infrastructure for which the network infrastructure was not originally designed to handle.” ‘314 patent, col. 1:37-42.

51. The ‘314 patent addresses the issue of identifying the data streams on which to perform the differentiated services, which may involve a significant processing penalty. “The problem with deploying these differentiated services within the existing network infrastructure is that the network infrastructure was not designed to support a wide variety application-specific and

subscriber specific services as the corresponding data flows through the network.” ‘314 patent, col. 1:47-52.

52. The inventions disclosed in the ‘314 patent provide significant benefits and improvements to the function of the hardware in a computer network by enabling differentiated services within the network infrastructure. By incorporating a service module within the network infrastructure that can intercept packets, determine whether the connection corresponds to a service application, and then break and reestablish the connection for application-specific processing, the invention allows for a more efficient and flexible network communication system.

53. The inventions taught by the ‘314 patent solves discrete, technological problems associated with computer systems, specifically those related to network communication systems. The patent addresses the limitations of existing network infrastructures that were not designed to support a wide variety of application-specific and subscriber-specific services as data flows through the network. It also solves the problem of the significant processing penalty associated with identifying the data streams on which to perform the differentiated services.

54. The ‘314 patent family has been cited by 1,466 United States and international patents and patent applications as relevant prior art. Specifically, 141 United States and international patents and patent applications have cited the ‘314 patent itself as relevant prior art. The following companies and research institutions have cited the ‘314 patent as relevant prior art:

- Cisco Technology, Inc.
- Alphabet Inc.
- Oracle Corporation
- International Business Machines Corp.
- Microsoft Corporation
- Qualcomm, Inc.
- Telefonaktiebolaget Lm Ericsson
- Intel Corporation
- Check Point Software Technologies Ltd.
- Hitachi, Ltd.

- Open Text Corporation
- Fujitsu Limited
- Broadcom Limited
- Samsung Electronics Co., Ltd.

U.S. PATENT NO. 7,136,353

55. U.S. Patent No. 7,136,353 (the “‘353 patent”) entitled, *Quality of Service Management for Multiple Connections Within a Network Communication System*, was filed on May 17, 2002. The ‘353 patent claims priority to Provisional Application No. 60/309,212, filed on July 31, 2001 and Provisional Application No. 60/291,825, filed on May 18, 2001. The ‘353 patent is subject to a 35 U.S.C. § 154(b) term extension of 945 days. A true and correct copy of the ‘353 patent is attached hereto as Exhibit 4.

56. The ‘353 patent has been in full force and effect since its issuance. OptiMorphix, Inc. owns by assignment the entire right, title, and interest in and to the ‘353 patent.

57. The ‘353 patent primarily relates to managing the quality of service (QoS) in a network communication system, especially focusing on multiple connections between a sender and a receiver. It introduces a methodology where a host-level transmission rate is allocated among multiple connections based on a ratio of a weight associated with each connection and the sum of the weights associated with the connections. This approach aims to optimize the transmission of data packets, particularly in environments where multiple connections to the same host might compete for bandwidth, ensuring efficient utilization and prioritization of data transmission.

58. The ‘353 patent is directed to solving the problem of efficiently managing multiple connections in a network communication system to optimize data packet transmission and improve the quality of service. It addresses issues related to the allocation of transmission rates among

multiple connections, selective transmission of data packets, and ensuring that higher priority connections are allocated a more significant portion of the available transmission rate than lower priority connections.

59. The '353 patent identifies shortcomings in the prior art. Specifically, the specification describes that conventional Transport Control Protocol (TCP) architectures, which were primarily designed for reliable, sequenced transmission of non-real-time data streams over high-bandwidth wireline channels, tend to exhibit sub-optimal performance when employed in environments with different or incompatible characteristics, such as wireless networks. Traditional TCP architectures face issues related to flow control, congestion control, and error recovery mechanisms, especially in scenarios involving multiple connections between a sender and a receiver, leading to inefficient use of resources and decreased overall throughput.

60. The inventions disclosed in the '353 patent provide significant benefits and improvements to the function of the hardware in a computer network by ensuring that data transmission across multiple connections is managed efficiently and prioritized according to the significance of each connection. The methodology ensures that higher priority connections are allocated more bandwidth, reducing bursty data transmissions and ensuring that data is transmitted at a rate that the communication channel can support, thereby optimizing the utilization of network resources and enhancing the overall quality of service.

61. The invention taught by the '353 patent solves discrete, technological problems associated with computer systems; specifically, it addresses the technical challenges related to managing and optimizing data packet transmission across multiple connections in a network communication system. It provides a systematic approach to allocate transmission rates, manage

data packet transmission, and prioritize connections, ensuring efficient utilization of network resources and improved quality of service.

62. The technologies taught in the '353 patent constitute an improvement in computer network technology by introducing a systematic and efficient methodology to manage multiple connections in a network communication system. The teachings in the '353 patent provide a mechanism to allocate transmission rates among connections, selectively transmit data packets, and prioritize connections based on associated weights, ensuring that higher priority connections are allocated a more significant portion of the available transmission rate, thereby optimizing data transmission and enhancing the quality of service in network communication systems.

63. The '353 patent family has been cited by 1,469 United States and international patents and patent applications as relevant prior art. Specifically, 77 United States and international patents and patent applications have cited the '353 patent itself as relevant prior art. The following companies and research institutions have cited the '353 patent as relevant prior art:

- Broadcom Limited
- Cisco Systems, Inc.
- Commscope, Inc.
- Intel Corporation
- Interdigital, Inc.
- Lumen Technologies, Inc
- Microsoft Corporation
- NEC Corporation
- Netapp Inc.
- Nokia Corporation
- Oracle Corporation
- Panasonic Corporation
- Rensselaer Polytechnic Institute
- Samsung Electronics Co., Ltd.
- Telefonaktiebolaget Lm

U.S. PATENT NO. 7,586,871

64. U.S. Patent No. 7,586,871 (the “‘871 patent”) entitled, *Platform and Method for Providing Data Services in a Communication Network*, was filed on January 11, 2006. The ‘871 patent claims priority to U.S. Application Ser. No. 10/061,953, which was filed on February 2, 2002, which claims the benefit of U.S. Provisional Applications No. 60/292,564, which was filed on May 22, 2001, and No. 60/293,756, which was filed on May 25, 2001. The ‘871 patent also claims the benefit of U.S. Provisional Application No. 60/654,730, which was filed on February 18, 2005. The ‘871 patent is subject to a 35 U.S.C. § 154(b) term extension of 748 days. A true and correct copy of the ‘871 patent is attached hereto as Exhibit 5.

65. The ‘871 patent has been in full force and effect since its issuance. OptiMorphix, Inc. owns by assignment the entire right, title, and interest in and to the ‘871 patent.

66. The ‘871 patent generally relates to a communication node and corresponding method for processing data communications passing through the node between a first data network and a second data network. The method includes detecting an event associated with data communication arriving at the node from the first data network, determining whether the data communication is to be suspended for service at the node based on the detected event, and processing suspended data communication based on information in the data communication. The patent also covers the detection of return data communication arriving at the node from the second data network in response to the processed data communication from the first data network. The detected return data communication is allowed to pass through the node without processing the detected return data communication.

67. The ‘871 patent is directed to solving the problem of efficiently providing data services, such as content filtering, in a communication network. This includes the ability to determine whether a packet flow should be suspended for filtering a content request based on

packet flow characteristics detected at the layers implemented in hardware, without the need for assistance from higher layers in the architecture implemented in software.

68. The '871 patent teaches the use of a communication node that processes data communication between two networks. This node detects an event associated with data communication from the first network, determines whether the data communication should be suspended for service at the node based on the detected event, and processes suspended data communication based on information in the data communication. The '871 patent also teaches the detection of return data communication from the second network in response to the processed data communication from the first network, allowing this return data communication to pass through the node without further processing. This approach allows for more efficient processing of data communication, reducing the need to inspect every packet in a flow and avoiding the need to terminate or establish a communication session associated with the data communication.

69. The inventions disclosed in the '871 patent provide significant benefits and improvements to the function of the hardware in a computer network. Specifically, the inventions taught by the '871 patent can determine whether a packet flow should be suspended for filtering a content request based on packet flow characteristics detected at the layers implemented in hardware. This improves the efficiency and scalability of content filtering and other services, particularly for mobile data networks that carry delay-sensitive traffic such as voice or video streaming traffic.

70. The '871 patent family has been cited by 962 United States and international patents and patent applications as relevant prior art. 166 United States and international patents and patent applications have cited the '871 patent itself as relevant prior art. The following companies and research institutions have cited the '871 patent as relevant prior art:

- A10 Networks, Inc.
- Thoma Bravo, LLC
- AT&T, Inc.
- NEC Corporation
- Nokia Corporation
- Cisco Systems, Inc.
- Juniper Networks, Inc.
- Fujitsu Limited

U.S. PATENT NO. 7,616,559

71. U.S. Patent No. 7,616,559 (the “‘559 patent”) entitled, *Multi-Link Network Architecture, Including Security, In Seamless Roaming Communications Systems And Methods*, was filed on September 2, 2004. The ‘559 patent claims priority to Provisional Application No. 60/499,648, which was filed on September 3, 2003. The ‘559 patent is subject to a 35 U.S.C. § 154(b) term extension of 638 days. A true and correct copy of the ‘559 patent is attached hereto as Exhibit 6.

72. The ‘559 patent has been in full force and effect since its issuance. OptiMorphix, Inc. owns by assignment the entire right, title, and interest in and to the ‘559 patent.

73. The ‘559 patent generally relates to a communications system that provides secure communications of information over multiple communication links. This system includes a client device, a server device, and at least one communication channels, elements, modes, and links for connecting the devices for communication of information between them. The system includes a link detector for determining the existence and usability of the communication links for communication of the information, a pathfinder for selecting one or more of the communication links for communication of at least some of the information, a link handover for switching to the selected one or more communication links for communication of the information or portion thereof, and an auto reconstructor for re-connecting to detected and selected one or more

communication links for communication of the information or portions of it in the event that any communication is hindered, terminated, or upset.

74. The '559 patent is directed to solving the problem of ensuring secure and reliable communication over multiple communication links, especially in environments that include mobile or other roaming devices capable of communicating over multiple channels and with channel switching characteristics.

75. The '559 patent identifies the shortcomings of the prior art. Specifically, the specification describes that when multiple links, both physical elements and the bands or channels within each such element, are employed for communications in data networks, substantial coordination of communicated information, as well as security of the information, is exponentially complicated. In wireless communications, concurrent or sequential operations can occur over cellular or wireless LAN technologies. Each of these wireless communications methods experiences substantially greater complexity in timing, security, packet sequencing, data loss, and connectivity, over wired communications conditions.

76. The '559 patent teaches the use of a system that includes a link detector for determining the existence and usability of the communication links for communication of the information, a pathfinder for selecting one or more of the communication links for communication of at least some of the information, a link handover for switching to the selected one or more communication links for communication of the information or portion thereof, and an auto reconnector for re-connecting to detected and selected one or more communication links for communication of the information or portions of it in the event that any communication is hindered, terminated, or upset.

77. The inventions disclosed in the ‘559 patent provide significant benefits and improvements to the function of the hardware in a computer network by ensuring secure and reliable communication over multiple communication links. This is particularly beneficial in environments that include mobile or other roaming devices capable of communicating over multiple channels and with channel switching characteristics. The system’s ability to detect usable communication links, select the most suitable ones, switch between them as needed, and reconnect in the event of communication disruption greatly enhances the reliability and efficiency of data transmission in a computer network.

78. The ‘559 patent family has been cited by 17 United States and international patents and patent applications as relevant prior art. Specifically, patents issued to the following companies and research institutions have cited the ‘559 patent family as relevant prior art:

- International Business Machines Corporation
- Samsung Electronics Co., Ltd
- Alphabet Inc.
- Research In Motion Limited
- BT Group plc

U.S. PATENT NO. 7,987,285

79. U.S. Patent No. 7,987,285 (the “‘285 patent”) entitled, *Adaptive Bitrate Management for Streaming Media Over Packet Networks*, was filed on July 9, 2008. The ‘285 patent claims priority to U.S. Provisional Application No. 60/948,917, which was filed on July 10, 2007. The ‘285 patent is subject to a 35 U.S.C. § 154(b) term extension of 105 days. A true and correct copy of the ‘285 patent is attached hereto as Exhibit 7.

80. The ‘285 patent has been in full force and effect since its issuance. OptiMorphix, Inc. owns by assignment the entire right, title, and interest in and to the ‘285 patent.

81. The '285 patent relates to adaptive bitrate management for streaming media over packet networks. It teaches a method that includes receiving a receiver report from a terminal, estimating network conditions of a media network based on the receiver report, determining an optimal session bitrate based on the estimated network conditions, and providing media data to the terminal based on the optimal session bitrate.

82. The '285 patent is directed to solving the problem of delivering bandwidth-intensive content like multimedia over capacity-limited, shared links, particularly in wireless networks. The challenge is to quickly respond to changes in network conditions by adjusting the bitrate and media encoding scheme to optimize the user's viewing and listening experience. This includes addressing issues like network buffer overflow, packet loss, playback stall, sudden adjustment of nominal transmission rate, packet loss due to link transmission errors or network congestion, reduction of effective bandwidth, and limited capacity in wireless networks.

83. The '285 patent identifies the shortcomings of the prior art. Specifically, existing rate control protocols and recommendations were insufficient for delivering multimedia sessions over wireless networks. Issues included sudden adjustments in nominal transmission rates, packet loss, reduction of effective bandwidth, limited capacity, infrequent and incomplete network state information, handling different media streams separately, and low bitrates available for wireless multimedia sessions. These challenges made it difficult to set up a consistent streaming media session.

84. The inventions disclosed in the '285 patent provide significant benefits and improvements to the function by enabling more efficient and responsive control over the bitrate of streaming media sessions according to instantaneous network capacity. This leads to better user experience in streaming media over wireless packet networks, minimizing issues like buffer

overflow, packet loss, and playback stall. The adaptive bitrate management system can work with existing media players and networks, providing a more robust and flexible solution for streaming media, especially in challenging wireless environments.

85. The inventions disclosed in the '285 patent solve discrete, technological problems associated with computer systems, particularly in the context of streaming media over packet networks. These problems include managing bitrate in fluctuating network conditions, handling different types of media streams, optimizing the viewing and listening experience, and addressing specific challenges in wireless networks such as interference, fading, link transmission errors, network congestion, and limited capacity. The patent provides technical solutions through adaptive bitrate management, network state estimation, control algorithms, and specific encoding and packetization methods.

86. The '285 patent family has been cited by 357 United States and international patents and patent applications as relevant prior art. Specifically, patents issued to the following companies and research institutions have cited the '285 patent family as relevant prior art:

- Alphabet Inc.
- Cisco Systems, Inc.
- Nokia Corporation
- Tencent Holdings Ltd.
- Hitachi Ltd.
- Oracle Corporation
- Microsoft Corporation
- DISH Network Corp.
- Broadcom Limited
- ***Amazon.com, Inc.***
- Samsung Electronics Co., Ltd.
- Comcast Corporation
- Canon Inc.
- Qualcomm, Inc.
- CommScope, Inc.
- Intel Corporation
- Meta Platforms, Inc.

- Verizon Communications Inc.

U.S. PATENT NO. 8,230,105

87. U.S. Patent No. 8,230,105 (the “‘105 patent”) entitled, *Adaptive Bitrate Management for Streaming Media Over Packet Networks*, was filed on July 25, 2011. The ‘105 patent is a continuation of U.S. Patent Application No. 12/170,347, which was filed July 9, 2008 and issued as U.S. Patent No. 7,987,285, and which claims the benefit of U.S. Provisional Application No. 60/948,917, which was filed July 10, 2007. A true and correct copy of the ‘105 patent is attached hereto as Exhibit 8.

88. The ‘105 patent has been in full force and effect since its issuance. OptiMorphix, Inc. owns by assignment the entire right, title, and interest in and to the ‘105 patent.

89. The ‘105 patent relates to a method for adaptive bitrate management in streaming media over packet networks. It discloses receiving a receiver report from a terminal, estimating network conditions based on the report, determining an optimal session bitrate according to the estimated network conditions, and providing media data to the terminal based on the optimal session bitrate. The patent emphasizes the need for rate control in delivering bandwidth-intensive content like multimedia over capacity-limited, shared links, and the challenges faced in wireless networks.

90. The ‘105 patent is directed to solving the problem of delivering consistent and optimized streaming media sessions over packet networks, particularly in wireless networks. The challenges include sudden adjustments in nominal transmission rates, packet loss, reduction of effective bandwidth, limited capacity, and difficulties in setting up a consistent streaming media session.

91. The ‘105 patent identifies the shortcomings of the prior art. Specifically, existing protocols and methods were inadequate in handling network buffer overflow, playback stall,

interference, fading, and other challenges in wireless networks. The existing solutions were not efficient in responding to changes in network conditions, and the typical wireless media player support was limited and sporadic, leading to difficulties in providing a good streaming experience.

92. The '105 patent teaches the use of adaptive bitrate management, which includes an adaptive bitrate controller and a variable bitrate encoder. This framework enables the delivery of self-adjusting streaming sessions to media players, such as standard 3GPP-compliant media players. It adjusts the bitrate according to instantaneous network capacity, optimizes performance by adjusting the streaming media bitrate, and implements joint session bitrate management for audio, video, and other streams simultaneously.

93. The inventions disclosed in the '105 patent provide significant benefits and improvements to the function of the hardware in a computer network by enabling more efficient and adaptive control of streaming media sessions. By dynamically adjusting the bitrate according to network conditions, the invention minimizes issues like buffer overflow, packet loss, and playback stall. It enhances the user's viewing and listening experience, particularly in wireless networks where traditional methods were inadequate.

94. The inventions taught by the '105 patent solves discrete, technological problems associated with computer systems and networks, particularly in the context of streaming media over packet networks. These problems include network buffer management, bitrate optimization, handling of packet loss, and adjustments to sudden changes in network conditions. The invention addresses these technical challenges through a comprehensive framework that adapts to the network's instantaneous capacity, ensuring a consistent and optimized streaming experience.

95. The ‘105 patent family has been cited by 357 United States and international patents and patent applications as relevant prior art. Specifically, patents issued to the following companies and research institutions have cited the ‘105 patent family as relevant prior art:

- *Amazon.com, Inc.*
- Hulu LLC
- Tencent Holdings Ltd.
- Cisco Systems, Inc.
- Oracle Corporation
- Microsoft Corporation
- Comcast Corporation
- Alphabet Inc.
- International Business Machines Corp.
- Hitachi, Ltd.
- Electronics And Telecommunications Research Institute
- EchoStar Technologies LLC
- Samsung Electronics Co., Ltd.
- Qualcomm, Inc.
- CommScope, Inc.
- Intel Corporation
- Meta Platforms, Inc.
- Verizon Communications Inc.
- Broadcom Limited

U.S. PATENT NO. 8,255,551

96. U.S. Patent No. 8,255,551 (the “‘551 patent”) entitled, *Adaptive Bitrate Management for Streaming Media Over Packet Networks*, was filed on July 29, 2011. The ‘551 patent is a continuation of U.S. Patent Application No. 12/416,085, which was filed March 31, 2009 and issued as U.S. Patent No. 7,991,904, and which is a continuation-in-part of U.S. Patent Application No. 12/170,347, which was filed July 9, 2008 and issued as U.S. Patent No. 7,987,285, which claims the benefit of U.S. Provisional Application No. 60/948,917 filed July 10, 2007. A true and correct copy of the ‘551 patent is attached hereto as Exhibit 9.

97. The '551 patent has been in full force and effect since its issuance. OptiMorphix, Inc. owns by assignment the entire right, title, and interest in and to the '551 patent.

98. The '551 patent pertains to adaptive bitrate management for streaming media over packet networks. It discloses a method that includes providing pseudo-streaming media data to a terminal, receiving a TCP acknowledgment, estimating network conditions based on the acknowledgment, determining an optimal session bitrate, and providing pseudo-streaming media data based on this optimal bitrate. The patent describes mechanisms for adjusting the bitrate of streaming media according to instantaneous network capacity, which is essential for delivering bandwidth-intensive content like multimedia over capacity-limited, shared links.

99. The '551 patent is directed to solving the problem of rate control for media streaming over packet networks, particularly in wireless environments. The challenge lies in quickly responding to changes in network conditions by adjusting the bitrate and media encoding scheme to optimize the user's viewing and listening experience. This includes addressing issues such as network buffer overflow, packet loss, playback stall, and the challenges encountered in delivering multimedia sessions over packet wireless networks.

100. The '551 patent identifies the shortcomings of the prior art. Specifically, traditional methods of rate control in packet networks are inadequate for handling the complexities of multimedia streaming. The prior art also lacks efficient adaptive bitrate management for wireless mobile phones, with challenges such as infrequent and incomplete network state information, separate handling of different media streams, and low media bitrates.

101. The inventions disclosed in the '551 patent provide significant benefits and improvements to the function of the hardware in a computer network by enabling precise control over the bitrate of streaming media. This leads to an optimized user experience by minimizing

issues like buffer overflow, packet loss, and playback stall. The adaptive bitrate management framework allows for joint session bitrate management for audio, video, and other streams simultaneously, and can be applied to all media transports that provide transmission progress report mechanisms. It also offers solutions tailored to the challenges of wireless networks, enhancing the quality of multimedia streaming in mobile environments.

102. The '551 patent addresses challenges and limitations specific to packet networks, particularly in the context of streaming media. For example, packet networks are often subject to rapid fluctuations in bandwidth and latency. These fluctuations can be caused by various factors such as interference, signal strength, user mobility, and network congestion. The '551 patent's adaptive bitrate management system is designed to continuously monitor network conditions and adjust the streaming bitrate accordingly, ensuring a consistent user experience despite these fluctuations.

103. The '551 patent addresses the inherent challenges and limitations of packet networks by providing a technological solution to handover challenges and Quality of Service (QoS) management. Specifically, as mobile devices move between different wireless access points or network types, seamless handover is essential to maintain an uninterrupted streaming experience. The technologies taught in the '551 patent are designed to handle these transitions smoothly, adapting to the new network conditions without disrupting the media playback. Further, ensuring QoS in wireless networks is complex due to the shared and unpredictable nature of the medium. The '551 patent discloses technology to manage the QoS by dynamically adjusting the bitrate and encoding scheme based on real-time network conditions, ensuring that the desired level of service is maintained.

104. The ‘551 patent family has been cited by 357 United States and international patents and patent applications as relevant prior art. Specifically, patents issued to the following companies and research institutions have cited the ‘551 patent family as relevant prior art:

- Alphabet Inc.
- Oracle Corporation
- AT&T Inc.
- Telefonaktiebolaget LM Ericsson
- International Business Machines Corp.
- Microsoft Corporation
- Cisco Systems, Inc.
- DISH Network Corp.
- Broadcom Limited
- ***Amazon.com, Inc.***
- Adobe Inc.
- Samsung Electronics Co., Ltd.
- Comcast Corporation
- Canon Inc.
- Technicolor S.A.
- Qualcomm, Inc.
- CommScope, Inc.
- Intel Corporation
- Meta Platforms, Inc.
- Hitachi, Ltd.
- Verizon Communications Inc.

U.S. PATENT NO. 10,412,388

105. U.S. Patent No. 10,412,388 (the “‘388 patent”) entitled, *Framework for Quality-Aware Video Optimization*, was filed on January 8, 2018. The ‘388 patent claims priority to U.S. Patent Application No. 12/751,951, which was filed on March 31, 2010, and which claims priority to U.S. Provisional Patent Application No. 61/165,224, which was filed on March 31, 2009. A true and correct copy of the ‘388 patent is attached hereto as Exhibit 10.

106. The ‘388 patent has been in full force and effect since its issuance. OptiMorphix, Inc. owns by assignment the entire right, title, and interest in and to the ‘388 patent.

107. The '388 patent generally relates to a method and system for quality-aware video optimization. It teaches receiving an encoded video frame, decompressing it, extracting a first quantization parameter (QP), and acquiring a delta QP based on the first QP. The method also includes acquiring a second QP based on the delta QP and the first QP, compressing the decompressed video frame based on the second QP, and providing the compressed video frame. The process allows for fine control of quality degradation in byte-reduced content and can be applied to transcoding scenarios where the input and output compression formats are different.

108. The '388 patent identifies the shortcomings of the prior art. Specifically, existing single-pass rate control techniques had a problem in that the relationship between the compressed byte size of a video frame and its quantization parameter were only known after the frame is encoded. This made it challenging to achieve byte reduction and controllable quality degradation in a single pass.

109. The '388 patent teaches the use of a quality-aware video optimization technique that modifies a video frame sequence to reduce the byte size while limiting perceptual quality degradation to a controllable level.

110. The inventions disclosed in the '388 patent provide significant benefits and improvements to the function of hardware in a computer network by enabling efficient video optimization. The method allows for single-pass, on-the-fly quality-aware optimization, making it well-suited for various environments, including live video feeds and storage arrays.

111. The '388 patent family has been cited by 30 United States and international patents and patent applications as relevant prior art. Specifically, patents issued to the following companies and research institutions have cited the '388 patent family as relevant prior art:

- Interdigital, Inc.
- Tencent Holdings Ltd

- Microsoft Corporation
- Qualcomm, Inc.
- Lattice Semiconductor
- Openwave Mobility, Inc.
- Samsung Electronics Co., Ltd.
- Beijing Dajia Interconnection Information Technology Co., Ltd.

U.S. PATENT NO. 9,167,021

112. U.S. Patent No. 9,167,021 (the “‘021 patent”) entitled, *Measuring Web Browsing Quality of Experience in Real-Time at An Intermediate Network Node*, was filed on March 30, 2012. The ‘021 patent is subject to a 35 U.S.C. § 154(b) term extension of 265 days. A true and correct copy of the ‘021 patent is attached hereto as Exhibit 11.

113. The ‘021 patent has been in full force and effect since its issuance. OptiMorphix, Inc. owns by assignment the entire right, title, and interest in and to the ‘021 patent.

114. The ‘021 patent is directed to solving the problem of accurately measuring the time needed to download a web page at an intermediate network node. Traditional methods of measuring download time at the client or server level are straightforward, but complications arise when content for a single web page is distributed across several physical servers or when measuring at an intermediate network node. The patent addresses these challenges by introducing a method to evaluate and compute the page unit time.

115. The ‘021 patent identifies the shortcomings of the prior art. Specifically, measuring the web page download time at an intermediate network node is practically not feasible due to the complexity of web page transactions. The prior art lacks an effective method to measure the time taken to download a complete web page at an intermediate network node, especially when content is distributed across several servers or when dynamic URLs are generated by client-side scripts.

116. The ‘021 patent teaches the use of a method that includes acquiring current HTTP transactions, determining their relation to web browsing for a specific client, and evaluating

whether they belong with the previous transactions set. By grouping transactions into page units and computing a page unit time, the method provides a way to measure the Quality of Experience (QoE) of web browsing in real-time at an intermediate network node.

117. The inventions disclosed in the '021 patent provide significant benefits and improvements to the function of the hardware in a computer network by enabling real-time measurement of web browsing QoE at an intermediate network node. This allows service providers to optimize network performance and take actions to enhance the browsing experience.

118. The inventions taught by the '021 patent solve discrete, technological problems associated with computer systems and network performance. Specifically, it addresses the technical challenges of measuring web browsing Quality of Experience (QoE) at an intermediate network node, considering the complexities of web page transactions, distributed content across servers, and dynamic URL generation. The solution provided by the '021 patent is rooted in technological innovation and contributes to the optimization of network performance and user experience.

119. The '021 patent family has been cited by 17 United States and international patents and patent applications as relevant prior art. Specifically, patents issued to the following companies and research institutions have cited the '021 patent family as relevant prior art:

- BT Group plc
- Meta Platforms, Inc.
- Cisco Systems, Inc.
- Telefonaktiebolaget Lm Ericsson
- Tencent Holdings Ltd
- Apple Inc.
- Nippon Telegraph & Telephone Corp.
- EchoStar Corporation
- Intel Corporation

U.S. PATENT NO. 10,362,081

120. U.S. Patent No. 10,362,081 (the “‘081 patent”) entitled, *Methods and Systems for Quantifying the Holistic Quality of Experience for Internet Multimedia*, was filed on August 30, 2013. The ‘081 patent is subject to a 35 U.S.C. § 154(b) term extension of 684 days. A true and correct copy of the ‘081 patent is attached hereto as Exhibit 12.

121. The ‘081 patent has been in full force and effect since its issuance. OptiMorphix, Inc. owns by assignment the entire right, title, and interest in and to the ‘081 patent.

122. The ‘081 patent generally relates to methods and systems for quantifying the holistic Quality of Experience (QoE) associated with transmitting multimedia, specifically Internet videos, via a network. The inventions disclosed in the ‘081 patent include obtaining multimedia data corresponding to the multimedia transmitted via the network and acquiring metrics associated with the multimedia data. These metrics include at least one multimedia transmitting metric and at least one multimedia quality metric. The ‘081 patent also teaches normalizing these metrics and determining the composite multimedia QoE metrics.

123. The ‘081 patent is directed to solving the problem of quantifying the Quality of Experience (QoE) for the transmission of Internet video over digital networks in a manner that takes into account both the quality of the video delivery and the picture quality. It addresses the challenges of bandwidth variations, frequent pauses, undesired buffering, and loss of video quality that can degrade the user’s experience of watching the video.

124. The ‘081 patent identifies the shortcomings of the prior art. Specifically, traditional video transmission infrastructures like cable TV are different from the Internet, which utilizes shared network infrastructure. The prior art struggled with dynamically varying bandwidth, especially with mobile communication devices, leading to frequent pauses and undesired buffering of video multimedia data. Current techniques to reduce video stalling often involve reducing the

video bitrate, which can result in an undesired loss of video quality. The existing methods lacked a comprehensive way to measure and improve the Quality of Experience (QoE) for users.

125. The '081 patent teaches the use of a system and method that includes obtaining multimedia data and acquiring metrics associated with the multimedia data. These metrics are normalized, and the composite multimedia QoE metrics are determined. The system can include a data processing module, a transaction history database, and a multimedia QoE score measurement module. The method involves measuring factors like multimedia smoothness index and multimedia start delay, allowing for a more quantitative and comprehensive assessment of the Quality of Experience (QoE) for Internet video.

126. The inventions disclosed in the '081 patent provide significant benefits and improvements to the functioning of a network by introducing a method to quantitatively measure the QoE for Internet video. This includes the ability to measure both the quality of video delivery and picture quality. By understanding and quantifying these aspects, service providers can make informed decisions to improve the user experience, optimize bandwidth usage, and reduce stalling and buffering in the transmission of multimedia data. The system's architecture, including the data processing module and multimedia QoE score measurement module, enables a more precise and efficient way to handle multimedia data.

127. The invention taught by the '081 patent solves discrete, technological problems associated with computer systems and Internet video transmission. These include challenges related to dynamically varying bandwidth, frequent pauses, undesired buffering, and loss of video quality. The invention provides a technical solution to measure and quantify these aspects, allowing for a more systematic approach to enhancing the Quality of Experience (QoE) for users.

128. The ‘081 patent family has been cited by 24 United States and international patents and patent applications as relevant prior art. Specifically, patents issued to the following companies and research institutions have cited the ‘081 patent family as relevant prior art:

- Apple Inc.
- Verizon Communications Inc.
- Samsung Electronics Co., Ltd.
- Telefonaktiebolaget Lm Ericsson
- Alphabet Inc.
- International Business Machines Corporation
- Intel Corporation
- Imax Corporation
- Microsoft Corporation
- EchoStar Corporation

COUNT I
INFRINGEMENT OF U.S. PATENT NO. 7,099,273

129. Plaintiff references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

130. Amazon designs, makes, uses, sells, and/or offers for sale in the United States products comprising systems and methods for data transport acceleration and management within a network communication system.

131. Amazon designs, makes, sells, offers to sell, imports, and/or uses the Amazon ‘273 Products. The “Amazon ‘273 Products” refers to all Amazon.com products, services, functionalities, and features that implement, in whole or in part, Bottleneck Bandwidth and Round-trip propagation time (“BBR”) congestion control. This includes, for example, the Amazon.com website that utilizes Amazon CloudFront and its incorporation of BBR congestion control. In addition, Amazon ‘273 Products includes all use of the BBR congestion control technology by Amazon.com that is at the direction, request, or control of Amazon.com. Additionally, “Amazon ‘273 Products” refers to all products, services, features, and functionalities of Amazon Web

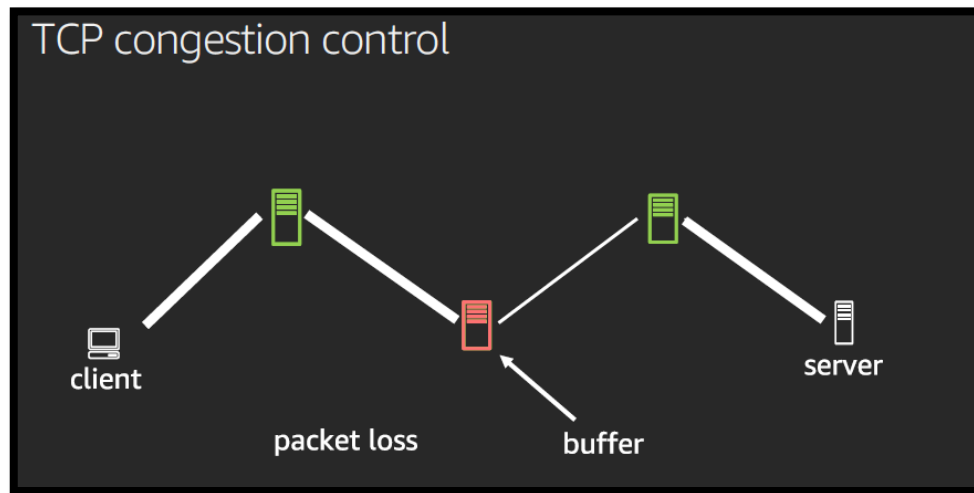
Services that implement BBR Congestion Control, in whole or in part. This includes, for example, Amazon CloudFront.

132. One or more Amazon subsidiaries and/or affiliates use the Amazon ‘273 Products in regular business operations.

133. One or more of the Amazon ‘273 Products include technology that performs the step of establishing a data connection between a sender and receiver using a handshake process.

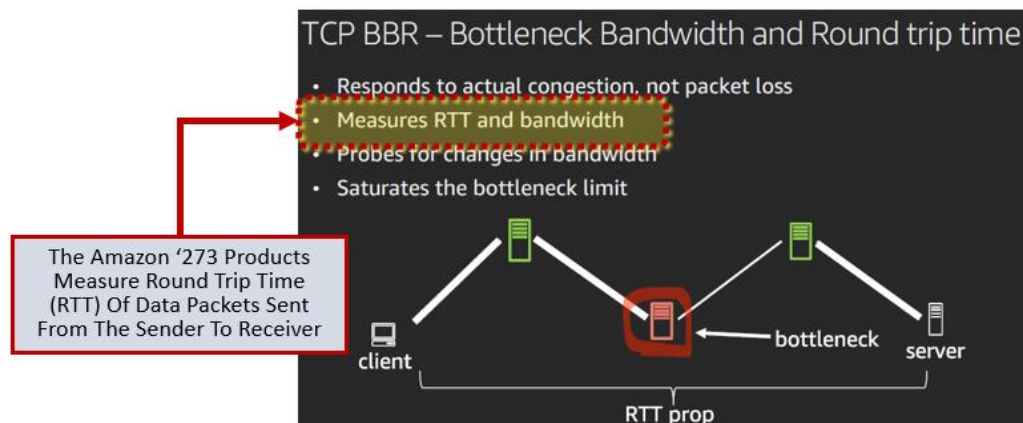
134. The Amazon ‘273 Products send a TCP packet with the SYN (Synchronize) flag set to the server. This packet contains an initial sequence number (ISN), which helps the server and client synchronize their sequence numbers. The ISN used by the Amazon ‘273 Products are represented as “x.” Upon receiving the SYN packet, the Amazon ‘273 Products sends a TCP packet back with both the SYN and ACK flags set. This packet contains two pieces of information: the responsive ISN, usually represented as ‘y,’ and an acknowledgment number, which is the ISN plus one (x+1). The acknowledgment number is used to confirm that the sender has received the SYN packet.

135. In establishing a connection between the sender and the receiver after receiving the SYN-ACK packet, the Amazon ‘273 Products send another packet with the ACK flag set. This packet contains an acknowledgment number, which is the ISN plus one (y+1).



Chris O'Brien, Tino Tran, Karthik Uthaman, *Optimizing For Performance In Amazon CloudFront: Every Millisecond Counts - Net309*, AMAZON PRESENTATION at 42 (2020).

136. The Amazon '273 Products measure round trip times (RTT) of packets sent between a client and server over a network. Specifically, the Amazon '273 Products measure the round-trip propagation time (RTprop) using the minimum round-trip time (RTT) for the connection by keeping track of the lowest observed RTT in the recent past. This value represents the round-trip propagation time (RTprop) of the connection.

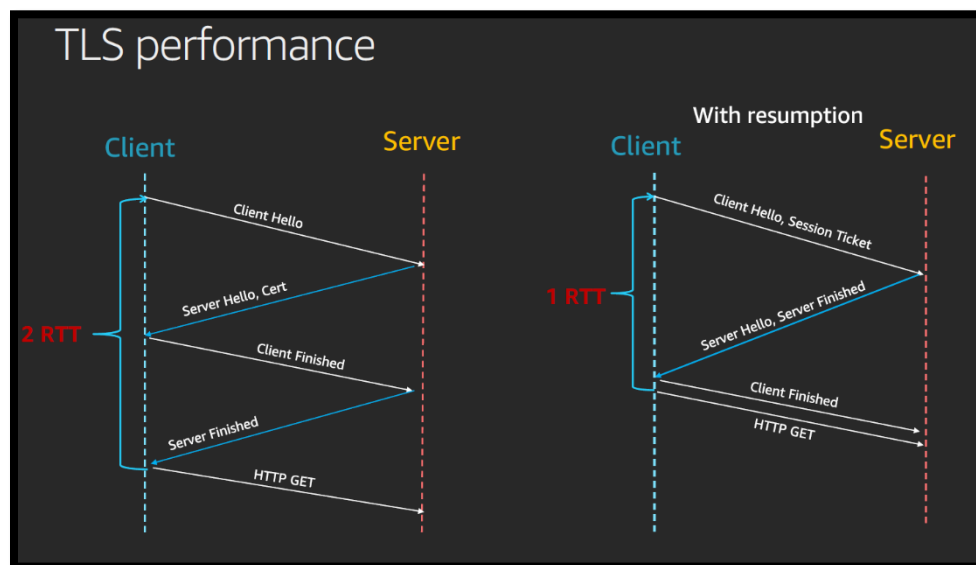


Chris O'Brien, Tino Tran, Karthik Uthaman, *Optimizing For Performance In Amazon CloudFront: Every Millisecond Counts - Net309*, AMAZON PRESENTATION at 43 (2020) (annotation added).

137. The Amazon '273 Products perform timestamping. Specifically, when a Amazon '273 Product transmits a data packet, it records the current time as a timestamp. The timestamp is stored in the transmission control block (TCB), which maintains the state of the TCP connection, including RTT measurements and other relevant information.

138. The Amazon '273 Products perform acknowledgment processing. Specifically, the Amazon '273 Products send an acknowledgment (ACK) for a specific packet, the sender processes the ACK and identifies the corresponding packet in the TCB. By matching the ACK with the original packet, the Amazon '273 Products retrieve the original timestamp associated with that packet.

139. The Amazon '273 Products perform a round-trip time (RTT) calculation. Specifically, the Amazon '273 Products calculate the RTT for a specific packet by subtracting the original timestamp from the current time when the ACK is received. This gives an individual RTT sample for that packet as explained in the below excerpt.



Chris O'Brien, Tino Tran, Karthik Uthaman, *Optimizing For Performance In Amazon CloudFront: Every Millisecond Counts - Net309*, AMAZON PRESENTATION at 43 (2020).

140. The Amazon ‘273 Products perform the step of MinRTT estimation. Specifically, the Amazon ‘273 Products maintain a running estimate of the minimum RTT observed (MinRTT) over a specified time window. The MinRTT is used by the Amazon ‘273 Products to estimate the base round-trip propagation time without queuing delay. When a new RTT sample is calculated, the Amazon ‘273 Products compare it with the current MinRTT value. If the new sample is lower than the existing MinRTT, the Amazon ‘273 Products update MinRTT with a new value.

141. The Amazon ‘273 Products perform round-trip time-based pacing. Specifically, the Amazon products use the MinRTT estimate in performing pacing rate and congestion window calculations to ensure the sending rate is adapted based on the observed network conditions. BBR’s pacing rate and congestion window calculations factor in the MinRTT value to maintain a balance between efficient data transfer and minimal congestion.

142. The Amazon ‘273 Products calculate a congestion window parameter, which defines the maximum quantity of unacknowledged data packets permitted to be transmitted to the recipient.

Using BBR in CloudFront has been favorable overall, with performance gains of up to 22% improvement on aggregate throughput across several networks and regions. These performance gains depend on a number of factors, including the resource size as well as the quality, capacity, and distance of the connectivity in a given last-mile network.

TCP BBR Congestion Control with Amazon CloudFront, AMAZON AWS BLOGS (July 17, 2019), available at: <https://aws.amazon.com/blogs/networking-and-content-delivery/tcp-bbr-congestion-control-with-amazon-cloudfront/>

143. The Amazon ‘273 Products calculate a pacing rate based on these estimates to determine how quickly it should transmit data.

144. The Amazon ‘273 Products calculate a congestion window. Specifically, the Amazon ‘273 Products calculate a cwnd value based on the estimated bottleneck bandwidth (BtlBw) and RTT to ensure the congestion window is large enough not to limit the sending rate

derived from the BtlBw and RTT estimates. This is done by setting the cwnd to the product of the estimated BtlBw and RTT: $cwnd = BtlBw * RTT$. The calculation done by the Amazon '273 Products ensures that the cwnd value is large enough to accommodate the in-flight data based on the BtlBw and RTT estimates, while also accounting for potential variations in network conditions.

145. The Amazon '273 Products calculate a congestion window (cwnd) based on the bottleneck bandwidth (BtlBw) and round-trip time (RTT) estimates to ensure the sending rate is not constrained by the window size. The cwnd effectively sets a limit on the number of unacknowledged data packets in transit, but it is not set by a specific parameter for the maximum number of unacknowledged packets.

146. The Amazon '273 Products transmit additional data packets to the receiver in response a transmit timer expiration. The period of the transmit timer is based on the round-trip time measurements and the congestion window parameter.

147. Amazon has directly infringed and continues to directly infringe the '273 patent by, among other things, making, using, offering for sale, and/or selling technology for transferring data from a sender to a receiver in a communication network, including but not limited to the Amazon '273 Products.

148. The Amazon '273 Products are available to businesses and individuals throughout the United States.

149. The Amazon '273 Products are provided to businesses and individuals located in the Eastern District of Texas.

150. By making, using, testing, offering for sale, and/or selling products and services for transferring data from a sender to a receiver in a communication network, including but not limited to the Amazon '273 Products, Amazon has injured Plaintiff and is liable to Plaintiff for directly

infringing one or more claims of the ‘273 patent, including at least claim 1 pursuant to 35 U.S.C. § 271(a).

151. Amazon also indirectly infringes the ‘273 patent by actively inducing infringement under 35 U.S.C. § 271(b).

152. Amazon has had knowledge of the ‘273 patent since at least service of this Complaint or shortly thereafter, and Amazon knew of the ‘273 patent and knew of its infringement, including by way of this lawsuit.

153. Alternatively, Amazon has had knowledge of the ‘273 patent since at least July 5, 2016, based on its citation of the ‘273 patent family as relevant prior art in at least 5 patents and patent applications that are assigned to and owned by Amazon:

- U.S. Patent No. 9,384,204 (granted July 5, 2016)
- U.S. Patent No. 11,494,339 (granted November 8, 2022)
- U.S. Patent No. 10,901,950 (granted January 26, 2021)
- U.S. Patent No. 10,019,457 (granted July 10, 2018)
- U.S. Patent No. 9,934,235 (granted April 3, 2018)

154. Amazon intended to induce patent infringement by third-party customers and users of the Amazon ‘273 Products and had knowledge that the inducing acts would cause infringement or was willfully blind to the possibility that its inducing acts would cause infringement. Amazon specifically intended and was aware that the normal and customary use of the accused products would infringe the ‘273 patent. Amazon performed the acts that constitute induced infringement, and would induce actual infringement, with knowledge of the ‘273 patent and with the knowledge that the induced acts would constitute infringement. For example, Amazon provides the Amazon ‘273 Products that have the capability of operating in a manner that infringe one or more of the claims of the ‘273 patent, including at least claim 1, and Amazon further provides documentation and training materials that cause customers and end users of the Amazon ‘273 Products to utilize

the products in a manner that directly infringe one or more claims of the ‘273 patent.¹⁵ By providing instruction and training to customers and end-users on how to use the Amazon ‘273 Products in a manner that directly infringes one or more claims of the ‘273 patent, including at least claim 1, Amazon specifically intended to induce infringement of the ‘273 patent. Amazon engaged in such inducement to promote the sales of the Amazon ‘273 Products, e.g., through Amazon user manuals, product support, marketing materials, and training materials to actively induce the users of the accused products to infringe the ‘273 patent. Accordingly, Amazon has induced and continues to induce users of the accused products to use the accused products in their ordinary and customary way to infringe the ‘273 patent, knowing that such use constitutes infringement of the ‘273 patent.

155. The ‘273 patent is well-known within the industry as demonstrated by multiple citations to the ‘273 patent in published patents and patent applications assigned to technology companies and academic institutions. Amazon is utilizing the technology claimed in the ‘273 patent without paying a reasonable royalty. Amazon is infringing the ‘273 patent in a manner best described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

¹⁵ See e.g., *Amazon CloudFront for Media – Best Practices for Streaming Media Delivery*, AMAZON AWS DOCUMENTATION (November 2020); *AWS re:Invent 2022 - Deliver great experiences with QUIC on Amazon CloudFront (NET401)*, AWS EVENTS YOUTUBE CHANNEL (December 6, 2022), available at: https://www.youtube.com/watch?v=AFR7z_vce20; *Amazon CloudFront for Media – AWS Whitepaper*, AMAZON AWS DOCUMENTATION (2023); *AWS re:Invent 2022 - HBO Max achieves scale and performance with Amazon CloudFront (NET312)*, AWS EVENTS YOUTUBE CHANNEL (December 2, 2022), available at: <https://www.youtube.com/watch?v=qtMMH4uJqi0>; *Amazon CloudFront Developer Guide API Version 2016-08-01*, AMAZON AWS DEVELOPER DOCUMENTATION (2016); *White Paper - A Practical Guide To Aws Media Services - Deploying Cloud-based Services for Streaming Video*, AMAZON AWS DOCUMENTATION (2019); *AWS re:Invent 2018: Amazon Prime Video: Delivering the Amazing Video Experience (CTD203-R1)*, AMAZON WEB SERVICES YOUTUBE CHANNEL (November 29, 2018), available <https://www.youtube.com/watch?v=2YAz20284FI>; and *Live Streaming on AWS with MediaStore – AWS Implementation Guide*, AMAZON AWS Documentation (June 2020).

156. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the ‘273 patent.

157. As a result of Amazon’s infringement of the ‘273 patent, Plaintiff has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Amazon’s infringement, but in no event less than a reasonable royalty for the use made of the invention by Amazon together with interest and costs as fixed by the Court.

COUNT II
INFRINGEMENT OF U.S. PATENT NO. 7,444,418

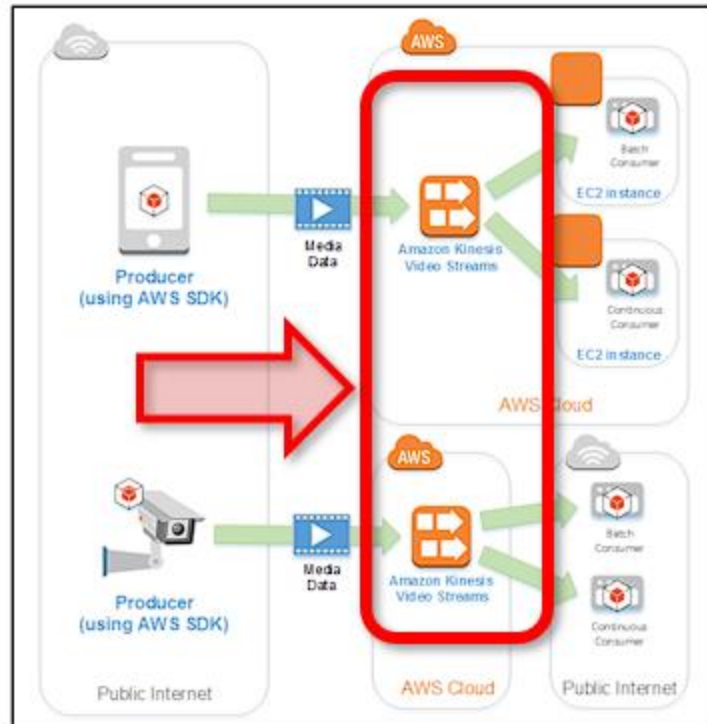
158. Plaintiff references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

159. Amazon designs, makes, uses, sells, and/or offers for sale in the United States products that transcode multimedia information within a network communication system.

160. Amazon designs, makes, sells, offers to sell, imports, and/or uses the following products: all versions and implementations of Amazon Kinesis Video Streams, Amazon Interactive Video Service (IVS) Real-Time Streaming, Amazon IVS Low-Latency Streaming, AWS Elemental MediaLive, AWS Elemental MediaConvert, AWS Elemental Delta, and AWS Elemental Server (collectively, the “Amazon ‘418 Product(s)”).

161. One or more Amazon subsidiaries and/or affiliates use the Amazon ‘418 Products in regular business operations.

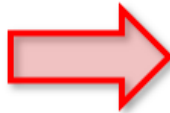
162. The Amazon ‘418 Products intercept digital multimedia information transmitted between a sender and a recipient, where the data is encoded at the sender using a primary transmission rate.



Amazon Kinesis Video Streams – How It Works, AMAZON AWS DOCUMENTATION, available at: <https://docs.aws.amazon.com/kinesisvideostreams/latest/dg/how-it-works.html> (last visited February 15, 2024) (emphasis added) (showing that the Amazon Kinesis product intercepts digital multimedia information transmitted between a sender and receiver).

163. The Amazon ‘418 Products contain functionality that performs intercepting digital multimedia information communicated between a transmitter and a receiver, with the digital multimedia information encoded at the transmitter at a first transmission rate. Specifically, the multimedia information is captured by the Amazon ‘418 Products as it is encoded at the transmitter side at a specific first transmission rate. This rate denotes the speed at which the data is being sent and is related to the compression methods used to make the data suitable for transmission.

164. The Amazon ‘418 Products calculate the accessible transmission rate for a connection on the recipient end, in which the estimation process involves determining the round-trip time for data packets exchanged between the service module and the recipient through the secondary communication channel.



Metric	Description	
URL	URL of the STUN/TURN server being tracked	
Port	Port number used by the client	
Protocol	Transport protocol extracted from ICE Server URL. If the value is UDP, ICE tries TURN over UDP, else ICE tried TURN over TCP/TLS. If the URI does not contain transport, ICE tries TURN over UDP and TCP/TLS. In case of STUN server, this field is empty.	
Total Requests Sent	The value is updated for every srflx candidate request and while sending binding request from turn candidates.	
Total Responses Received	The value is updated every time a STUN binding response is received.	
Total Round Trip Time	The value is updated every time an equivalent response is received for a request. The request packet is tracked in a hash map with the checksum as	

KINESIS VIDEO STREAMS - AMAZON KINESIS VIDEO STREAMS WEBRTC DEVELOPER GUIDE at 34 (2023) (emphasis added).

165. The Amazon ‘418 Products contain functionality for estimating an available transmission rate of a receiver-side connection. This step is critical for dynamically adapting the multimedia stream to match the capabilities of the receiving end and the conditions of the network. The estimation process performed by the Amazon ‘418 Products involves measuring the trip time of data packets communicated between the service module and the receiver via the second channel. By accurately gauging the available bandwidth, the Amazon ‘418 Products can dynamically adapt to the multimedia stream.

166. The Amazon ‘418 Products contain functionality wherein if the initial transmission rate exceeds the transmission rate, the digital multimedia information is transcoded to adapt it to the available transmission rate, ensuring compatibility.

167. The Amazon ‘418 Products contain functionality that, if the first transmission rate is greater than the available transmission rate, transcodes the digital multimedia information to conform the digital multimedia information to the available transmission rate. Specifically, the

Amazon '418 Products determine if there is a need for transcoding by comparing the first transmission rate (original encoding rate) with the estimated available transmission rate.

168. If the Amazon '418 Products determine there is a need for transcoding, the Amazon '418 Products convert the media data from one format and/or bitrate to another. Specifically, the Amazon '418 Products alter the bit rate of the media data to match the estimated available transmission rate.

169. The Amazon '418 Products contain functionality for performing conditional transcoding based on real-time network conditions.

170. The Amazon '418 Products convey transcoded multimedia data to the recipient via the receiver-end connection, utilizing a transmission rate derived from the estimated accessible transmission rate.

171. The Amazon '418 Products transmit transcoded multimedia information to the receiver over the receiver-side connection at a transmission rate determined from the estimated available transmission rate.

172. The Amazon '418 Products enable packaging multimedia information into suitable data packets for transmission.

173. The Amazon '418 Products transmit encoded data packets over a network to the receiver via transmission protocols.

174. Amazon has directly infringed and continues to directly infringe the '418 patent by, among other things, making, using, offering for sale, and/or selling technology that transcode multimedia information within a network communication system, including but not limited to the Amazon '418 Products.

175. The Amazon ‘418 Products are available to businesses and individuals throughout the United States.

176. The Amazon ‘418 Products are provided to businesses and individuals located in this District.

177. By making, using, testing, offering for sale, and/or selling products and services that transcode multimedia information within a network communication system, including but not limited to the Amazon ‘418 Products, Amazon has injured Plaintiff and is liable to Plaintiff for directly infringing one or more claims of the ‘418 patent, including at least claim 23 pursuant to 35 U.S.C. § 271(a).

178. Amazon also indirectly infringes the ‘418 patent by actively inducing infringement under 35 U.S.C. § 271(b).

179. Amazon has had knowledge of the ‘418 patent since at least service of this Complaint or shortly thereafter, and Amazon knew of the ‘418 patent and knew of its infringement, including by way of this lawsuit.

180. Alternatively, Amazon has had knowledge of the ‘418 patent since at least May 7, 2013, based on its citation of the ‘418 patent as relevant prior art in two patents and patent applications that are assigned to and owned by Amazon. These patents and patent applications include:

- U.S. Patent No. 8,437,261 (granted May 7, 2013)
- U.S. Patent No. 7,817,563 (granted October 19, 2010)

181. Amazon intended to induce patent infringement by third-party customers and users of the Amazon ‘418 Products and had knowledge that the inducing acts would cause infringement or was willfully blind to the possibility that its inducing acts would cause infringement. Amazon specifically intended and was aware that the normal and customary use of the accused products

would infringe the ‘418 patent. Amazon performed the acts that constitute induced infringement, and would induce actual infringement, with knowledge of the ‘418 patent and with the knowledge that the induced acts would constitute infringement. For example, Amazon provides the Amazon ‘418 Products that have the capability of operating in a manner that infringe one or more of the claims of the ‘418 patent, including at least claim 23, and Amazon further provides documentation and training materials that cause customers and end users of the Amazon ‘418 Products to utilize the products in a manner that directly infringe one or more claims of the ‘418 patent.¹⁶ By providing instruction and training to customers and end-users on how to use the Amazon ‘418

¹⁶ See e.g., *Amazon Interactive Video Service Low-Latency Streaming User Guide*, AMAZON DOCUMENTATION (2023); *AWS On Air ft. Introducing Real-Time Streaming with Amazon IVS*, AWS EVENTS YOUTUBE CHANNEL (September 5, 2023), available at: <https://www.youtube.com/watch?v=-xiwrx-g01Q>; *Amazon IVS Low-Latency Streaming API Reference API Version 2020-07-14*, AMAZON DOCUMENTATION (July 14, 2020); *AWS for M&E Video Tutorials: Monitoring and Key Metrics for Amazon Interactive Video Service*, AWS FOR MEDIA & ENTERTAINMENT (February 17, 2022), available at: <https://www.youtube.com/watch?v=LnRDJOxLoiw>; *Amazon IVS Real-Time Streaming User Guide*, AMAZON DOCUMENTATION (2023); *AWS Elemental Server User Guide Version 2.17*, AMAZON DOCUMENTATION (2023); *AWS Elemental Conductor File API And User Guide 2.16.1 Release*, AMAZON DOCUMENTATION (August 29, 2020); *AWS Elemental Server API And User Guide 2.16.1 Release*, Amazon Documentation (August 29, 2020); *MediaLive User Guide*, AMAZON DOCUMENTATION (2023); *AWS Elemental MediaLive API Reference*, AMAZON DOCUMENTATION (2023); *AWS re:Invent 2020: Live content production on the AWS Cloud*, AWS EVENTS YOUTUBE CHANNEL (February 5, 2023), available at: <https://www.youtube.com/watch?v=Ed1pz83FlrQ>; *AWS Elemental MediaConvert User Guide*, AMAZON DOCUMENTATION (2023); *AWS Elemental MediaLive API Reference*, AMAZON DOCUMENTATION (2023); *File-based transcoding using Automated ABR Configuration with AWS Elemental MediaConvert*, AWS for Media & Entertainment (June 7, 2022); available at: <https://www.youtube.com/watch?v=QMs7fFKHPQw>; *Kinesis Video Streams - Amazon Kinesis Video Streams WebRTC Developer Guide*, AWS DOCUMENTATION (2023); *AWS re:Invent 2019: [REPEAT 1] Building a streaming data platform with Amazon Kinesis (ANT326-R1)*, AWS EVENTS YOUTUBE CHANNEL (December 4, 2019), available at: <https://www.youtube.com/watch?v=TAkcRD6OxPw>; *Amazon Kinesis Video Streams Developer Guide*, AMAZON AWS DOCUMENTATION (2023); *Connect your camera using Amazon Kinesis Video Streams for WebRTC in 10 minutes*, AWS IoT YOUTUBE CHANNEL (May 26, 2023), available at: <https://www.youtube.com/watch?v=8GZDmdBwVqU>; *AWS IoT and Amazon Kinesis Video Streams for Connected Home Applications*, AMAZON AWS PRESENTATION (August 16, 2020); *KVS ingestion from RTSP cameras a Kinesis Video Streams tutorial*, AMAZON WEB SERVICES YOUTUBE CHANNEL (May 31, 2022), available at: <https://www.youtube.com/watch?v=nVxwX7Q9nPU>; and *Deep Dive - Amazon Kinesis Video Streams - AWS Online Tech Talks*, AWS DEVELOPERS YOUTUBE CHANNEL (January 24, 2018); available at <https://www.youtube.com/watch?v=EzxRtfSKIUA>.

Products in a manner that directly infringes one or more claims of the ‘418 patent, including at least claim 23, Amazon specifically intended to induce infringement of the ‘418 patent. Amazon engaged in such inducement to promote the sales of the Amazon ‘418 Products, e.g., through Amazon user manuals, product support, marketing materials, and training materials to actively induce the users of the accused products to infringe the ‘418 patent. Accordingly, Amazon has induced and continues to induce users of the accused products to use the accused products in their ordinary and customary way to infringe the ‘418 patent, knowing that such use constitutes infringement of the ‘418 patent.

182. The ‘418 patent is well-known within the industry as demonstrated by multiple citations to the ‘418 patent in published patents and patent applications assigned to technology companies and academic institutions. Amazon is utilizing the technology claimed in the ‘418 patent without paying a reasonable royalty. Amazon is infringing the ‘418 patent in a manner best described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

183. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the ‘418 patent.

184. As a result of Amazon’s infringement of the ‘418 patent, Plaintiff has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Amazon’s infringement, but in no event less than a reasonable royalty for the use made of the invention by Amazon together with interest and costs as fixed by the Court.

COUNT III
INFRINGEMENT OF U.S. PATENT NO. 7,031,314

185. Plaintiff references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

186. Amazon designs, makes, uses, sells, and/or offers for sale in the United States products for providing differentiated services within a network communication system.

187. Amazon designs, makes, sells, offers to sell, imports, and/or uses the following products: AWS Elastic Load Balancers Version 2.0 and later including AWS Application Load Balancers, AWS Network Load Balancers, and AWS Gateway Load Balancers (collectively, the “Amazon ‘314 Product(s)’”).

188. One or more Amazon subsidiaries and/or affiliates use the Amazon ‘314 Products in regular business operations.

189. The Amazon ‘314 Products comprise a processing unit.

190. The Amazon ‘314 Products comprise a storage component, functionally connected to the processor, responsible for retaining data and instructions that, upon execution by the processor, direct the processor’s operations.

191. The memory unit in the Amazon ‘314 Products stores data related to connections, service applications, and other system elements. In addition, the Amazon ‘314 Products store in memory instructions that guide the processor in classifying connections, forming connections, and redirecting data.

192. The Amazon ‘314 Products contain functionality for requesting a connection between the client and server to ascertain if it aligns with predefined service criteria, where the predetermined service criteria are linked to at least one of the multiple service applications.

193. The Amazon ‘314 Products perform differentiated services within a network communication system. Specifically, The Amazon ‘314 Products contain functionality for classifying a connection that has been requested between the client and the server to determine whether the connection matches predetermined service criteria. When a connection is requested,

various attributes of the request are analyzed by the Amazon '314 Products. These attributes could include the source, destination, requested service type, priority, or other data associated with the connection.

194. The Amazon '314 Products compare attributes associated with a connection against predetermined service criteria. Specifically, the predetermined service criteria can include a set of rules or conditions associated with various service applications.

195. The Amazon '314 Products contain functionality for establishing an initial connection between the client and the service module, and a subsequent connection between the service module and the server when the connection aligns with the predefined service requirements.

196. The Amazon '314 Products include functionality that enables forming two connections: a first connection between the client and the service module, and a second connection between the service module and a server. The forming of a first and second connection is done by the Amazon '314 Products in response to a connection matching the predetermined service criteria.

197. The Amazon '314 Products orchestrate the formation of a connection between the client and the service module, following the protocols and parameters that relate to the classified service criteria.

198. The Amazon '314 Products establish a connection between the service module and a server.

199. The Amazon '314 Products comprise functionality that utilizes the initial and secondary connections to redirect a portion or more of the data communication between the client and a server towards the service application related to the pre-established service parameters.

200. The Amazon '314 Products comprise a service module that manages the flow of data between the client and the server, directing a portion or all of the data to specific service applications based on the matched criteria.

201. Amazon has directly infringed and continues to directly infringe the '314 patent by, among other things, making, using, offering for sale, and/or selling technology comprising a system for performing differentiated services within a network communication system, including but not limited to the Amazon '314 Products.

202. The Amazon '314 Products are available to businesses and individuals throughout the United States.

203. The Amazon '314 Products are provided to businesses and individuals located in this District.

204. By making, using, testing, offering for sale, and/or selling products and services comprising a system for performing differentiated services within a network communication system, including but not limited to the Amazon '314 Products, Amazon has injured Plaintiff and is liable to Plaintiff for directly infringing one or more claims of the '314 patent, including at least claim 27 pursuant to 35 U.S.C. § 271(a).

205. Amazon also indirectly infringes the '314 patent by actively inducing infringement under 35 U.S.C. § 271(b).

206. Amazon has had knowledge of the '314 patent since at least service of this Complaint or shortly thereafter, and Amazon knew of the '314 patent and knew of its infringement, including by way of this lawsuit.

207. Alternatively, Amazon has had knowledge of the ‘314 patent since at least July 5, 2016, based on its citation of the ‘314 patent family as relevant prior art in at least 5 patents and patent applications that are assigned to and owned by Amazon:

- U.S. Patent No. 9,384,204 (granted July 5, 2016)
- U.S. Patent No. 11,494,339 (granted November 8, 2022)
- U.S. Patent No. 10,901,950 (granted January 26, 2021)
- U.S. Patent No. 10,019,457 (granted July 10, 2018)
- U.S. Patent No. 9,934,235 (granted April 3, 2018)

208. Amazon intended to induce patent infringement by third-party customers and users of the Amazon ‘314 Products and had knowledge that the inducing acts would cause infringement or was willfully blind to the possibility that its inducing acts would cause infringement. Amazon specifically intended and was aware that the normal and customary use of the accused products would infringe the ‘314 patent. Amazon performed the acts that constitute induced infringement, and would induce actual infringement, with knowledge of the ‘314 patent and with the knowledge that the induced acts would constitute infringement. For example, Amazon provides the Amazon ‘314 Products that have the capability of operating in a manner that infringe one or more of the claims of the ‘314 patent, including at least claim 27, and Amazon further provides documentation and training materials that cause customers and end users of the Amazon ‘314 Products to utilize the products in a manner that directly infringe one or more claims of the ‘314 patent.¹⁷ By

¹⁷ See e.g., *Elastic Load Balancing User Guide*, AMAZON AWS DOCUMENTATION (2023); *AWS re:Invent 2021 - How to choose the right load balancer for your AWS workloads*, AWS EVENTS YOUTUBE CHANNEL (December 15, 2021), available at: <https://www.youtube.com/watch?v=p0YZBF03r5A&t=23s>; *Advanced Request Routing for AWS Application Load Balancers*, AWS NEWS BLOG (March 27, 2019), available at: <https://aws.amazon.com/blogs/aws/new-advanced-request-routing-for-aws-application-load-balancers/>; *Elastic Load Balancing Application Load Balancers*, AMAZON AWS DOCUMENTATION (2023); *AWS re:Invent 2018: [REPEAT 1] Elastic Load Balancing: Deep Dive and Best Practices (NET404-R1)*, AMAZON WEB SERVICES YOUTUBE CHANNEL (November 29, 2018), available at: <https://www.youtube.com/watch?v=VIgAT7vjol8>; *AWS Prescriptive Guidance Choosing a stickiness strategy for your load balancer*, AMAZON AWS DOCUMENTATION (2023); and *Elastic*

providing instruction and training to customers and end-users on how to use the Amazon ‘314 Products in a manner that directly infringes one or more claims of the ‘314 patent, including at least claim 27, Amazon specifically intended to induce infringement of the ‘314 patent. Amazon engaged in such inducement to promote the sales of the Amazon ‘314 Products, e.g., through Amazon user manuals, product support, marketing materials, and training materials to actively induce the users of the accused products to infringe the ‘314 patent. Accordingly, Amazon has induced and continues to induce users of the accused products to use the accused products in their ordinary and customary way to infringe the ‘314 patent, knowing that such use constitutes infringement of the ‘314 patent.

209. The ‘314 patent is well-known within the industry as demonstrated by multiple citations to the ‘314 patent in published patents and patent applications assigned to technology companies and academic institutions. Amazon is utilizing the technology claimed in the ‘314 patent without paying a reasonable royalty. Amazon is infringing the ‘314 patent in a manner best described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

210. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the ‘314 patent.

211. As a result of Amazon’s infringement of the ‘314 patent, Plaintiff has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Amazon’s infringement, but in no event less than a reasonable royalty for the use made of the invention by Amazon together with interest and costs as fixed by the Court.

Load Balancing API Reference – API Version 2015-12-01, AMAZON AWS DOCUMENTATION (2023).

COUNT IV
INFRINGEMENT OF U.S. PATENT NO. 7,136,353

212. Plaintiff references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

213. Amazon designs, makes, uses, sells, and/or offers for sale in the United States products comprising technology for managing multiple connections for sending data packets between a sender and a receiver in a computer network.

214. Amazon designs, makes, sells, offers to sell, imports, and/or uses the following products: AWS Elastic Load Balancers Version 2.0 and later including AWS Application Load Balancers, AWS Network Load Balancers, and AWS Gateway Load Balancers (collectively, the “Amazon ‘353 Product(s)”).

215. One or more Amazon subsidiaries and/or affiliates use the Amazon ‘353 Products in regular business operations.

216. The Amazon ‘353 Products determine a host-level transmission rate between the sender and receiver by summing a current transmission rate associated with each of a plurality of connections.

217. The Amazon ‘353 Products identify a present transmission rate for individual connections between a host and client device.

218. The Amazon ‘353 Products conduct automated bandwidth discovery in which a bandwidth test is performed by sending a short burst of bidirectional traffic and measuring the received rate at each end.

219. The Amazon ‘353 Products compute a host-level transmission rate by totaling the current transmission rates over several connections.

220. The Amazon '353 Products perform bandwidth aggregation across connections that utilizes all available links to deliver packets across different connections.

221. The Amazon '353 Products allocate the host-level transmission rate across multiple connections based on a ratio of a weight related to each connection and the total of the weights for set of multiple connections.

222. The Amazon '353 Products choose data packets for transmission in a way that each chosen data packet is linked with the connection exhibiting the greatest discrepancy between the allocated transmission rate and the actual transmission rate for the connection.

223. The Amazon '353 Products perform packet scheduling including through the use of a guaranteed minimum aggregate bandwidth during congestion based on scheduler weight (or percentage of bandwidth).

224. The Amazon '353 Products allocate the host-level transmission rate among the plurality of connections based on a ratio of a weight associated with each connection and a sum of the weights for the plurality of connections.

225. The Amazon '353 Products transmit data packets from the host across the related connections based on data packets associated with connections having a highest difference between the allocated transmission rate and an actual transmission rate are transmitted first. Further, each data packet being transmitted from the sender is transmitted in response to each expiration of a transmission timer having a period corresponding to the host-level transmission rate.

226. Amazon has directly infringed and continues to directly infringe the '353 patent by, among other things, making, using, offering for sale, and/or selling technology for managing

multiple connections for sending data packets between a sender and a receiver in a computer network, including but not limited to the Amazon ‘353 Products.

227. The Amazon ‘353 Products are available to businesses and individuals throughout the United States.

228. The Amazon ‘353 Products are provided to businesses and individuals located in this District.

229. By making, using, testing, offering for sale, and/or selling products and services comprising technology for managing multiple connections for sending data packets between a sender and a receiver in a computer network, including but not limited to the Amazon ‘353 Products, Amazon has injured Plaintiff and is liable to Plaintiff for directly infringing one or more claims of the ‘353 patent, including at least claim 13 pursuant to 35 U.S.C. § 271(a).

230. Amazon also indirectly infringes the ‘353 patent by actively inducing infringement under 35 U.S.C. § 271(b).

231. Amazon has had knowledge of the ‘353 patent since at least service of this Complaint or shortly thereafter, and Amazon knew of the ‘353 patent and knew of its infringement, including by way of this lawsuit.

232. Amazon intended to induce patent infringement by third-party customers and users of the Amazon ‘353 Products and had knowledge that the inducing acts would cause infringement or was willfully blind to the possibility that its inducing acts would cause infringement. Amazon specifically intended and was aware that the normal and customary use of the accused products would infringe the ‘353 patent. Amazon performed the acts that constitute induced infringement, and would induce actual infringement, with knowledge of the ‘353 patent and with the knowledge that the induced acts would constitute infringement. For example, Amazon provides the Amazon

‘353 Products that have the capability of operating in a manner that infringe one or more of the claims of the ‘353 patent, including at least claim 13, and Amazon further provides documentation and training materials that cause customers and end users of the Amazon ‘353 Products to utilize the products in a manner that directly infringe one or more claims of the ‘353 patent.¹⁸ By providing instruction and training to customers and end-users on how to use the Amazon ‘353 Products in a manner that directly infringes one or more claims of the ‘353 patent, including at least claim 13, Amazon specifically intended to induce infringement of the ‘353 patent. Amazon engaged in such inducement to promote the sales of the Amazon ‘353 Products, e.g., through Amazon user manuals, product support, marketing materials, and training materials to actively induce the users of the accused products to infringe the ‘353 patent. Accordingly, Amazon has induced and continues to induce users of the accused products to use the accused products in their ordinary and customary way to infringe the ‘353 patent, knowing that such use constitutes infringement of the ‘353 patent.

233. The ‘353 patent is well-known within the industry as demonstrated by multiple citations to the ‘353 patent in published patents and patent applications assigned to technology companies and academic institutions. Amazon is utilizing the technology claimed in the ‘353 patent without paying a reasonable royalty. Amazon is infringing the ‘353 patent in a manner best

¹⁸ See e.g., *Elastic Load Balancing User Guide*, AMAZON AWS DOCUMENTATION (2023); AWS *re:Invent 2021 - How to choose the right load balancer for your AWS workloads*, AWS EVENTS YOUTUBE CHANNEL (December 15, 2021), available at: <https://www.youtube.com/watch?v=p0YZBF03r5A&t=23s>; *Advanced Request Routing for AWS Application Load Balancers*, AWS NEWS BLOG (March 27, 2019), available at: <https://aws.amazon.com/blogs/aws/new-advanced-request-routing-for-aws-application-load-balancers/>; *Elastic Load Balancing Application Load Balancers*, AMAZON AWS DOCUMENTATION (2023); AWS *re:Invent 2018: [REPEAT 1] Elastic Load Balancing: Deep Dive and Best Practices (NET404-R1)*, AMAZON WEB SERVICES YOUTUBE CHANNEL (November 29, 2018), available at: <https://www.youtube.com/watch?v=VIgAT7vjol8>; *AWS Prescriptive Guidance Choosing a stickiness strategy for your load balancer*, AMAZON AWS DOCUMENTATION (2023); and *Elastic Load Balancing API Reference – API Version 2015-12-01*, AMAZON AWS DOCUMENTATION (2023).

described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

234. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the ‘353 patent.

235. As a result of Amazon’s infringement of the ‘353 patent, Plaintiff has suffered monetary damages, and seek recovery in an amount adequate to compensate for Amazon’s infringement, but in no event less than a reasonable royalty for the use made of the invention by Amazon together with interest and costs as fixed by the Court.

COUNT V
INFRINGEMENT OF U.S. PATENT NO. 7,586,871

236. Plaintiff references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

237. Amazon designs, makes, uses, sells, and/or offers for sale in the United States products that process data communications passing through a node between a first data network and a second data network.

238. Amazon designs, makes, sells, offers to sell, imports, and/or uses the following products: AWS Network Firewall, AWS Network Firewall Endpoint, AWS Network Firewall Traffic Processing, AWS Network Firewall Advanced Inspection Endpoint, AWS Network Firewall Advanced Inspection Traffic Processing, and AWS NAT Gateway (collectively, the “Amazon ‘871 Product(s)”).

239. One or more Amazon subsidiaries and/or affiliates use the Amazon ‘871 Products in regular business operations.

240. The Amazon ‘871 Products detect an event associated with a data communication arriving at the node from a first data network.

241. The Amazon '871 Products monitor incoming data packets at the node from a first data network.

242. The Amazon '871 Products determine whether the data communication is to be suspended for service at the node based on the detected event. Specifically, once an event associated with the data communication is detected by the Amazon '871 Products, the system evaluates the nature and severity of the event. The decision to suspend or allow the communication is based on rules and policies configured by the Amazon '871 Products.

243. The Amazon '871 Products determine (based on a detected event) whether the data communication should be suspended at the node.

244. The Amazon '871 Products process one or more suspended data communications using information in the suspended data communication. Specifically, the Amazon '871 Products isolate the suspended data communication for (at least in part) the purpose of processing the suspended data communication. Based on the analysis and processing, the Amazon '871 Products determine how to handle the suspended data communication.

245. The Amazon '871 Products detect a return data communication arriving at the node from the second data network in response to the processed data communication from the first data network. Further, the Amazon '871 Products allow the detected return data communication to pass through the node without processing.

246. The Amazon '871 Products monitor the incoming data communication from the second data network. If the detected return data communication is associated with prior processed data communication from the first network the Amazon '871 Products determine that the return data communication does not need further processing at the node.

247. The Amazon ‘871 Products process a suspended data communication based on information in the data communication.

248. Amazon has directly infringed and continues to directly infringe the ‘871 patent by, among other things, making, using, offering for sale, and/or selling technology that process data communications passing through a node between a first data network and a second data network, including but not limited to the Amazon ‘871 Products.

249. The Amazon ‘871 Products are available to businesses and individuals throughout the United States.

250. The Amazon ‘871 Products are provided to businesses and individuals located in this District.

251. By making, using, testing, offering for sale, and/or selling products and services that process data communications passing through a node between a first data network and a second data network, including but not limited to the Amazon ‘871 Products, Amazon has injured Plaintiff and is liable to Plaintiff for directly infringing one or more claims of the ‘871 patent, including at least claim 1 pursuant to 35 U.S.C. § 271(a).

252. Amazon also indirectly infringes the ‘871 patent by actively inducing infringement under 35 U.S.C. § 271(b).

253. Amazon has had knowledge of the ‘871 patent since at least service of this Complaint or shortly thereafter, and Amazon knew of the ‘871 patent and knew of its infringement, including by way of this lawsuit.

254. Amazon intended to induce patent infringement by third-party customers and users of the Amazon ‘871 Products and had knowledge that the inducing acts would cause infringement or was willfully blind to the possibility that its inducing acts would cause infringement. Amazon

specifically intended and was aware that the normal and customary use of the accused products would infringe the ‘871 patent. Amazon performed the acts that constitute induced infringement, and would induce actual infringement, with knowledge of the ‘871 patent and with the knowledge that the induced acts would constitute infringement. For example, Amazon provides the Amazon ‘871 Products that have the capability of operating in a manner that infringe one or more of the claims of the ‘871 patent, including at least claim 1, and Amazon further provides documentation and training materials that cause customers and end users of the Amazon ‘871 Products to utilize the products in a manner that directly infringe one or more claims of the ‘871 patent.¹⁹ By providing instruction and training to customers and end-users on how to use the Amazon ‘871 Products in a manner that directly infringes one or more claims of the ‘871 patent, including at least claim 1, Amazon specifically intended to induce infringement of the ‘871 patent. Amazon engaged in such inducement to promote the sales of the Amazon ‘871 Products, e.g., through Amazon user manuals, product support, marketing materials, and training materials to actively induce the users of the accused products to infringe the ‘871 patent. Accordingly, Amazon has induced and continues to induce users of the accused products to use the accused products in their

¹⁹ See e.g., *Deployment models for AWS Network Firewall*, AMAZON AWS BLOGS (September 10, 2021), available at: <https://aws.amazon.com/blogs/networking-and-content-delivery/deployment-models-for-aws-network-firewall/>; *AWS Network Firewall - API Reference- API Version 2020-11-12*, AMAZON AWS DOCUMENTATION (November 12, 2020); *AWS Summit ANZ 2021 - AWS Network Firewall and network security in Amazon VPC*, AWS EVENTS YOUTUBE CHANNEL (January 3, 2022), available at: <https://www.youtube.com/watch?v=WNFknf9zyZg>; *Networking Foundation NET201 Presentation*, AMAZON AWS NET201 PRESENTATION (2021); *AWS re:Inforce 2022 - An overview of AWS firewall services and where to use them (NIS201)*, AWS EVENTS YOUTUBE CHANNEL (July 29, 2022), available at: <https://www.youtube.com/watch?v=I18OWIm2OsA>; *AWS Prescriptive Guidance AWS Security Reference Architecture*, AMAZON AWS DOCUMENTATION (2023); and *AWS re:Inforce 2022 - Design your firewall deployments to protect your internet applications(NIS301)*, AWS EVENTS YOUTUBE CHANNEL (July 29, 2022), available at: <https://www.youtube.com/watch?v=LLuxZDf6vrs>.

ordinary and customary way to infringe the ‘871 patent, knowing that such use constitutes infringement of the ‘871 patent.

255. The ‘871 patent is well-known within the industry as demonstrated by multiple citations to the ‘871 patent in published patents and patent applications assigned to technology companies and academic institutions. Amazon is utilizing the technology claimed in the ‘871 patent without paying a reasonable royalty. Amazon is infringing the ‘871 patent in a manner best described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

256. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the ‘871 patent.

257. As a result of Amazon’s infringement of the ‘871 patent, Plaintiff has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Amazon’s infringement, but in no event less than a reasonable royalty for the use made of the invention by Amazon together with interest and costs as fixed by the Court.

COUNT VI
INFRINGEMENT OF U.S. PATENT NO. 7,616,559

258. Plaintiff references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

259. Amazon designs, makes, uses, sells, and/or offers for sale in the United States products that communicate information over multiple communications links.

260. Amazon designs, makes, sells, offers to sell, imports, and/or uses the following products: AWS Elastic Load Balancers Version 2.0 and later including AWS Application Load Balancers, AWS Network Load Balancers, and AWS Gateway Load Balancers (collectively, the “Amazon ‘559 Product(s)”).

261. One or more Amazon subsidiaries and/or affiliates use the Amazon ‘559 Products in regular business operations.

262. The Amazon ‘559 Products identify an initial communication path with a specific security protocol for the transmission of data between a client system and a server system.

263. The Amazon ‘559 Products detect a first communications link having a first security feature for communicating data between a client device and a server device. The Amazon ‘559 Products utilize algorithms to ensure the first security level’s parameters, such as encryption and authentication protocols are met. By identifying the presence of this first communications link, the Amazon ‘559 Products can prioritize a communications link for use based on predefined security requirements or other criteria.

264. The Amazon ‘559 Products contain functionality for identifying an alternate communication pathway that possesses a different level of security for exchanging data between a client and a server.

265. The Amazon ‘559 Products detect a second communications link having a second security feature. The second communications link enables data to be sent between a client and server. Further, the Amazon ‘559 Products monitor network channels and enable security protocols to evaluate the parameters of the second communications link. The security features used by the Amazon ‘559 Products include encryption standards and/or authentication technology. The second communications link serves to ensure continuous data transfer by the Amazon ‘559 Products if the first communications link is unavailable.

266. The Amazon ‘559 Products determine if the initial communication path is inaccessible, opting for the alternate communication pathway with its distinct security level, to facilitate data transmission between a client and server.

267. The Amazon ‘559 Products select the first communications link, having first security, for communicating between a client device and a server. After the detection of both the first and second communications links, the Amazon ‘559 Products prioritize the link with the higher security features (e.g., first link) for data transmission. This prioritization by the Amazon ‘559 Products is based on pre-established security criteria and network conditions. If the first link meets the requirements, it is selected by the Amazon ‘559 Products to provide enhanced security and reliability.

268. The Amazon ‘559 Products maintain a connection with one of either the initial or alternate communication pathways, to ensure uninterrupted data exchange between the client system and the server system.

269. If the first communications link is not available, the Amazon ‘559 Products select the second communications link having second security, for communicating between the client device and the server device. This action is prompted when the preferred first link, typically with higher security, is unavailable or fails to meet a criteria. The Amazon ‘559 Products switch to the second link, ensuring continuous communication. While generally considered less secure, the second link serves as a contingency, allowing uninterrupted information flow between a client and server.

270. If the data transmission is interrupted over the alternate communication pathway, the Amazon ‘559 Products contain functionality for restoring the connection to the initial communication link to continue exchanging information between the client and the server.

271. The Amazon ‘559 Products enable linking to one of either the first communications link and the second communications link, to maintain communicative connectivity during communications between the client and server. The Amazon ‘559 Products establish a dynamic

link management process, maintaining an active connection by continuously evaluating both communication links.

272. The Amazon ‘559 Products contain functionality where if communication disruption occurs over the primary communication link, the alternate communication link is reestablished to facilitate the exchange of information between the client and server.

273. The Amazon ‘559 Products enable reconnecting to the first communications link for communicating information between the client and server if communications are hindered over the second communications link. This step is a part of a resilient communication strategy that actively monitors both links and switches back to the first link when issues are detected with the second communications link.

274. The Amazon ‘559 Products enable reconnecting to the second communications link for communicating information between the client device and the server device, if communications are hindered over the first communications link. If issues are detected on the primary link, the Amazon ‘559 Products automatically switch to the secondary link, maintaining the communication while also adhering to the security protocols.

275. Amazon has directly infringed and continues to directly infringe the ‘559 patent by, among other things, making, using, offering for sale, and/or selling technology comprising a method of communicating information over multiple communications links, including but not limited to the Amazon ‘559 Products.

276. The Amazon ‘559 Products are available to businesses and individuals throughout the United States.

277. The Amazon ‘559 Products are provided to businesses and individuals located in this District.

278. By making, using, testing, offering for sale, and/or selling products and services comprising a method of communicating information over multiple communications links, including but not limited to the Amazon ‘559 Products, Amazon has injured Plaintiff and is liable to Plaintiff for directly infringing one or more claims of the ‘559 patent, including at least claim 5 pursuant to 35 U.S.C. § 271(a).

279. Amazon also indirectly infringes the ‘559 patent by actively inducing infringement under 35 U.S.C. § 271(b).

280. Amazon has had knowledge of the ‘559 patent since at least service of this Complaint or shortly thereafter, and Amazon knew of the ‘559 patent and knew of its infringement, including by way of this lawsuit.

281. Amazon intended to induce patent infringement by third-party customers and users of the Amazon ‘559 Products and had knowledge that the inducing acts would cause infringement or was willfully blind to the possibility that its inducing acts would cause infringement. Amazon specifically intended and was aware that the normal and customary use of the accused products would infringe the ‘559 patent. Amazon performed the acts that constitute induced infringement, and would induce actual infringement, with knowledge of the ‘559 patent and with the knowledge that the induced acts would constitute infringement. For example, Amazon provides the Amazon ‘559 Products that have the capability of operating in a manner that infringe one or more of the claims of the ‘559 patent, including at least claim 5, and Amazon further provides documentation and training materials that cause customers and end users of the Amazon ‘559 Products to utilize the products in a manner that directly infringe one or more claims of the ‘559 patent.²⁰ By

²⁰ See e.g., *Elastic Load Balancing User Guide*, AMAZON AWS DOCUMENTATION (2023); AWS *re:Invent 2021 - How to choose the right load balancer for your AWS workloads*, AWS EVENTS YOUTUBE CHANNEL (December 15, 2021), available at: <https://www.youtube.com/watch?v=p0YZBF03r5A&t=23s>; *Advanced Request Routing for AWS*

providing instruction and training to customers and end-users on how to use the Amazon ‘559 Products in a manner that directly infringes one or more claims of the ‘559 patent, including at least claim 5, Amazon specifically intended to induce infringement of the ‘559 patent. Amazon engaged in such inducement to promote the sales of the Amazon ‘559 Products, e.g., through Amazon user manuals, product support, marketing materials, and training materials to actively induce the users of the accused products to infringe the ‘559 patent. Accordingly, Amazon has induced and continues to induce users of the accused products to use the accused products in their ordinary and customary way to infringe the ‘559 patent, knowing that such use constitutes infringement of the ‘559 patent.

282. The ‘559 patent is well-known within the industry as demonstrated by multiple citations to the ‘559 patent in published patents and patent applications assigned to technology companies and academic institutions. Amazon is utilizing the technology claimed in the ‘559 patent without paying a reasonable royalty. Amazon is infringing the ‘559 patent in a manner best described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

283. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the ‘559 patent.

Application Load Balancers, AWS NEWS BLOG (March 27, 2019), available at: <https://aws.amazon.com/blogs/aws/new-advanced-request-routing-for-aws-application-load-balancers/>; *Elastic Load Balancing Application Load Balancers*, AMAZON AWS DOCUMENTATION (2023); *AWS re:Invent 2018: [REPEAT 1] Elastic Load Balancing: Deep Dive and Best Practices (NET404-R1)*, AMAZON WEB SERVICES YOUTUBE CHANNEL (November 29, 2018), available at: <https://www.youtube.com/watch?v=VIgAT7vjol8>; *AWS Prescriptive Guidance Choosing a stickiness strategy for your load balancer*, AMAZON AWS DOCUMENTATION (2023); and *Elastic Load Balancing API Reference – API Version 2015-12-01*, AMAZON AWS DOCUMENTATION (2023).

284. As a result of Amazon's infringement of the '559 patent, Plaintiff has suffered monetary damages, and seeks recovery in an amount adequate to compensate for Amazon's infringement, but in no event less than a reasonable royalty for the use made of the invention by Amazon together with interest and costs as fixed by the Court.

COUNT VII
INFRINGEMENT OF U.S. PATENT NO. 7,987,285

285. Plaintiff references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

286. Amazon designs, makes, uses, sells, and/or offers for sale in the United States products comprising technology for adaptive bitrate management for streaming media over packet networks.

287. Amazon designs, makes, sells, offers to sell, imports, and/or uses the following products: Amazon Echo Show (Gen 1 and later), Amazon Chime, and Amazon Kinesis Video Streams (collectively, the "Amazon '285 Product(s)").

288. One or more Amazon subsidiaries and/or affiliates use the Amazon '285 Products in regular business operations.

289. The Amazon '285 Products obtain a best-suited session bitrate.

290. The Amazon '285 Products initiate a session by leveraging an adaptive bitrate algorithm (e.g., Dynamic Adaptive Streaming over HTTP (DASH)), to fetch the optimal session bitrate. This involves network probing to converge to an optimal bitrate that maximizes Quality of Experience (QoE) while minimizing re-buffering events and latency.

291. The Amazon '285 Products allocate the optimal session bitrate among audio and video streams to yield ideal bitrates for both, with the allocation partially based on giving precedence to either the audio or video data.

292. The Amazon ‘285 Products partition the optimal session bitrate into audio and video components. This allocation is computed by accounting not only the intrinsic complexities of each media stream but also the current contextual priorities.

293. The Amazon ‘285 Products compress the audio and video content in accordance with the derived optimal audio and video bitrates.

294. The Amazon ‘285 Products use specialized codecs for each media type—including the AAC (Advanced Audio Codec) for audio and H.264/AVC for video. These codecs utilize entropy coding, quantization, and transform techniques to compress the raw audio and video streams according to the pre-determined optimal bitrates. The encoding process employs CABAC (Context-Adaptive Binary Arithmetic Coding) for entropy coding and employing spatial and temporal prediction for further compression.

295. The Amazon ‘285 Products deliver compressed audio and video information for transmission to an end device.

296. The Amazon ‘285 Products encapsulate the encoded audio and video streams into a container format such as MPEG-4 Part 14 (.mp4) or Matroska (.mkv). This container is then chunked and packetized for delivery.

297. Amazon has directly infringed and continues to directly infringe the ‘285 patent by, among other things, making, using, offering for sale, and/or selling technology for adaptive bitrate management for streaming media over packet networks, including but not limited to the Amazon ‘285 Products.

298. The Amazon ‘285 Products are available to businesses and individuals throughout the United States.

299. The Amazon ‘285 Products are provided to businesses and individuals located in this District.

300. By making, using, testing, offering for sale, and/or selling products and services comprising technology for adaptive bitrate management for streaming media over packet networks, including but not limited to the Amazon ‘285 Products, Amazon has injured Plaintiff and is liable to Plaintiff for directly infringing one or more claims of the ‘285 patent, including at least claim 9 pursuant to 35 U.S.C. § 271(a).

301. Amazon also indirectly infringes the ‘285 patent by actively inducing infringement under 35 U.S.C. § 271(b).

302. Amazon has had knowledge of the ‘285 patent since at least service of this Complaint or shortly thereafter, and Amazon knew of the ‘285 patent and knew of its infringement, including by way of this lawsuit.

303. Alternatively, Amazon has had knowledge of the ‘285 patent since at least October 4, 2016, based on its citation of the ‘285 patent family as relevant prior art in seven patents and patent applications that are assigned to and owned by Amazon. These patents and patent applications include:

- U.S. Patent No. 10,104,140 (granted October 16, 2018)
- U.S. Patent No. 11,297,355 (granted April 5, 2022)
- U.S. Patent No. 11,343,551 (granted May 24, 2022)
- U.S. Patent No. 11,394,620 (granted July 19, 2022)
- U.S. Patent No. 11,659,212 (granted May 23, 2023)
- U.S. Patent Application No. 2017/0026438 (published January 26, 2017, granted October 16, 2018)
- U.S. Patent No. 9,462,019 (granted October 4, 2016)

304. Amazon intended to induce patent infringement by third-party customers and users of the Amazon ‘285 Products and had knowledge that the inducing acts would cause infringement or was willfully blind to the possibility that its inducing acts would cause infringement. Amazon

specifically intended and was aware that the normal and customary use of the accused products would infringe the ‘285 patent. Amazon performed the acts that constitute induced infringement, and would induce actual infringement, with knowledge of the ‘285 patent and with the knowledge that the induced acts would constitute infringement. For example, Amazon provides the Amazon ‘285 Products that have the capability of operating in a manner that infringe one or more of the claims of the ‘285 patent, including at least claim 9, and Amazon further provides documentation and training materials that cause customers and end users of the Amazon ‘285 Products to utilize the products in a manner that directly infringe one or more claims of the ‘285 patent.²¹ By providing instruction and training to customers and end-users on how to use the Amazon ‘285 Products in a manner that directly infringes one or more claims of the ‘285 patent, including at least claim 9, Amazon specifically intended to induce infringement of the ‘285 patent. Amazon

²¹ See e.g., *Amazon Kinesis Video Streams Developer Guide*, AMAZON AWS DOCUMENTATION (2023); *Connect your camera using Amazon Kinesis Video Streams for WebRTC in 10 minutes*, AWS IoT YOUTUBE CHANNEL (May 26, 2023), available at: <https://www.youtube.com/watch?v=8GZDmdBwVqU>; *AWS IoT and Amazon Kinesis Video Streams for Connected Home Applications*, AMAZON AWS PRESENTATION (August 16, 2020); *Alexa Smart Properties - Onboard and Implement Skill-Based WebRTC Calling for Alexa Smart Properties*, AMAZON ALEXA DEVELOPER DOCUMENTATION (2013), available at: <https://developer.amazon.com/en-US/docs/alexa/alexa-smart-properties/get-started-calling-api-for-asp.html>; Paul Socha, *Alexa Smart Properties: WebRTC skill code and deployment*, AMAZON DEVELOPER BLOG (August 1, 2023), available at: <https://developer.amazon.com/en-US/blogs/alexa/alexa-skills-kit/2023/08/alexa-smart-properties-webrtc-skill-code-deployment>; *Amazon Alexa Interface Reference*, AMAZON ALEXA DEVELOPER DOCUMENTATION (2023), available at: <https://developer.amazon.com/en-US/docs/alexa/device-apis/alexa-interface-reference.html>; Paul Socha, *Alexa Smart Properties enables audio and video calling between Echo and non-Echo devices with WebRTC*, AMAZON DEVELOPER BLOG (July 10, 2023), available at: <https://developer.amazon.com/en-US/blogs/alexa/alexa-skills-kit/2023/07/webrtc-alexa-launch-july-2023>; *Leveraging Amazon Chime Voice Connector for SIP Trunking*, AMAZON WHITEPAPER (April 2020); *Amazon Chime SDK, API Reference*, AMAZON CHIME DOCUMENTATION (2023); *Amazon Chime IAPI Reference Version 2018-05-01*, AMAZON CHIME DOCUMENTATION (2018); *AWS Black Belt Online Seminar – Amazon Chime*, AMAZON WEB SERVICES JAPAN YOUTUBE CHANNEL (December 10, 2019); available at: <https://www.youtube.com/watch?v=pVP075gme4o>; *AWS re:Invent 2020: Embed video conferencing in any app with the Amazon Chime SDK*, AWS EVENTS YOUTUBE CHANNEL (February 5, 2021), available at: <https://www.youtube.com/watch?v=XEFMhCtynKo>; *AWS Summit DC 2021: Blackboard delivers quality classes with Amazon Chime SDK*, AWS EVENTS YOUTUBE CHANNEL (February 5, 2021), available at: <https://www.youtube.com/watch?v=XEFMhCtynKo>.

engaged in such inducement to promote the sales of the Amazon ‘285 Products, e.g., through Amazon user manuals, product support, marketing materials, and training materials to actively induce the users of the accused products to infringe the ‘285 patent. Accordingly, Amazon has induced and continues to induce users of the accused products to use the accused products in their ordinary and customary way to infringe the ‘285 patent, knowing that such use constitutes infringement of the ‘285 patent.

305. The ‘285 patent is well-known within the industry as demonstrated by multiple citations to the ‘285 patent in published patents and patent applications assigned to technology companies and academic institutions. Amazon is utilizing the technology claimed in the ‘285 patent without paying a reasonable royalty. Amazon is infringing the ‘285 patent in a manner best described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

306. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the ‘285 patent.

307. As a result of Amazon’s infringement of the ‘285 patent, Plaintiff has suffered monetary damages, and seek recovery in an amount adequate to compensate for Amazon’s infringement, but in no event less than a reasonable royalty for the use made of the invention by Amazon together with interest and costs as fixed by the Court.

COUNT VIII
INFRINGEMENT OF U.S. PATENT NO. 8,230,105

308. Plaintiff references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

309. Amazon designs, makes, uses, sells, and/or offers for sale in the United States products comprising streaming technology that optimizes audio-video bitrate allocation.

310. Amazon designs, makes, sells, offers to sell, imports, and/or uses the following products: Amazon Echo Show (Gen 1 and later), Amazon Chime, and Amazon Kinesis Video Streams (collectively, the “Amazon ‘105 Product(s)”).

311. One or more Amazon subsidiaries and/or affiliates use the Amazon ‘105 Products in regular business operations.

312. The Amazon ‘105 Products obtain an optimal session bitrate for media streaming.

313. The Amazon ‘105 Products receive an optimal session bitrate. Specifically, this determination is based on one or more factors including network conditions, available bandwidth, and device capabilities.

314. The Amazon ‘105 Products divide this optimal session bitrate between audio and video data to yield the best-suited bitrates for each.

315. The Amazon ‘105 Products allocate the optimal session bitrate between audio and video media data to produce an optimal audio bitrate and an optimal video bitrate, wherein allocating the optimal session bitrate between audio and video media data is based on a metric selected from a group including a predetermined allocation, a user preference, an optimal performance data, privileging one type of data over the other, and an amount of audio and video media data to be provided.

316. In accordance with MPEG-DASH standard, the Amazon ‘105 Products are responsible for calculating or receiving an optimal session bitrate based on network conditions and/or the client’s capabilities.

317. The Amazon ‘105 Products base the bitrate allocation on criteria chosen from a set that includes pre-defined ratios, user settings, performance metrics, prioritizing one media type over the other, and the volume of audio and video data to be delivered.

318. The bitrate allocation used by the Amazon '105 Products is based on a metric selected from a group including a predetermined allocation, a user preference, an optimal performance data, privileging one type of data over the other, and an amount of audio and video media data to be provided.

319. The Amazon '105 Products compress the audio and video content as per the determined optimal audio and video bitrates.

320. The Amazon '105 Products encode audio and video media data according to the optimal audio bitrate and the optimal video bitrate.

321. The Amazon '105 Products make available the compressed audio and video streams for forwarding to an end device.

322. The Amazon '105 Products encode audio and video media data according to the optimal audio bitrate and the optimal video bitrate. This is achieved through utilizing encoding algorithms that are tailored to the bitrates allocated for each type of media. By compressing the media data according to these specific bitrates, the system ensures that the audio and video streams are packaged in a way that maximizes quality while adhering to the bandwidth limitations.

323. Amazon has directly infringed and continues to directly infringe the '105 patent by, among other things, making, using, offering for sale, and/or selling streaming technology that optimizes audio-video bitrate allocation, including but not limited to the Amazon '105 Products.

324. The Amazon '105 Products are available to businesses and individuals throughout the United States.

325. The Amazon '105 Products are provided to businesses and individuals located in this District.

326. By making, using, testing, offering for sale, and/or selling products and services comprising streaming technology that optimizes audio-video bitrate allocation, including but not limited to the Amazon ‘105 Products, Amazon has injured Plaintiff and is liable to Plaintiff for directly infringing one or more claims of the ‘105 patent, including at least claim 16 pursuant to 35 U.S.C. § 271(a).

327. Amazon also indirectly infringes the ‘105 patent by actively inducing infringement under 35 U.S.C. § 271(b).

328. Amazon has had knowledge of the ‘105 patent since at least service of this Complaint or shortly thereafter, and Amazon knew of the ‘105 patent and knew of its infringement, including by way of this lawsuit.

329. Alternatively, Amazon has had knowledge of the ‘105 patent since at least July 19, 2022, based on its citation of the ‘105 patent as relevant prior art in the following patent assigned to and owned by Amazon: U.S. Patent No. 11,394,620 (granted July 19, 2022).

330. In addition, Amazon has cited the ‘105 patent family in at least 6 patents and patent applications including the following patents and patent applications:

- U.S. Patent No. 10,104,140 (granted October 16, 2018)
- U.S. Patent No. 11,297,355 (granted April 5, 2022)
- U.S. Patent No. 11,343,551 (granted May 24, 2022)
- U.S. Patent No. 11,659,212 (granted May 23, 2023)
- U.S. Patent Application No. 2017/0026438 (published January 26, 2017, granted October 16, 2018)
- U.S. Patent No. 9,462,019 (granted October 4, 2016)

331. Amazon intended to induce patent infringement by third-party customers and users of the Amazon ‘105 Products and had knowledge that the inducing acts would cause infringement or was willfully blind to the possibility that its inducing acts would cause infringement. Amazon specifically intended and was aware that the normal and customary use of the accused products

would infringe the ‘105 patent. Amazon performed the acts that constitute induced infringement, and would induce actual infringement, with knowledge of the ‘105 patent and with the knowledge that the induced acts would constitute infringement. For example, Amazon provides the Amazon ‘105 Products that have the capability of operating in a manner that infringe one or more of the claims of the ‘105 patent, including at least claim 16, and Amazon further provides documentation and training materials that cause customers and end users of the Amazon ‘105 Products to utilize the products in a manner that directly infringe one or more claims of the ‘105 patent.²² By providing instruction and training to customers and end-users on how to use the Amazon ‘105 Products in a manner that directly infringes one or more claims of the ‘105 patent, including at least claim 16, Amazon specifically intended to induce infringement of the ‘105 patent. Amazon engaged in such inducement to promote the sales of the Amazon ‘105 Products, e.g., through

²² See e.g., *Amazon Kinesis Video Streams Developer Guide*, AMAZON AWS DOCUMENTATION (2023); *Connect your camera using Amazon Kinesis Video Streams for WebRTC in 10 minutes*, AWS IoT YOUTUBE CHANNEL (May 26, 2023), available at: <https://www.youtube.com/watch?v=8GZDmdBwVqU>; *AWS IoT and Amazon Kinesis Video Streams for Connected Home Applications*, AMAZON AWS PRESENTATION (August 16, 2020); *Alexa Smart Properties - Onboard and Implement Skill-Based WebRTC Calling for Alexa Smart Properties*, AMAZON ALEXA DEVELOPER DOCUMENTATION (2013), available at: <https://developer.amazon.com/en-US/docs/alexa/alexa-smart-properties/get-started-calling-api-for-asp.html>; Paul Socha, *Alexa Smart Properties: WebRTC skill code and deployment*, AMAZON DEVELOPER BLOG (August 1, 2023), available at: <https://developer.amazon.com/en-US/blogs/alexa/alexa-skills-kit/2023/08/alexa-smart-properties-webrtc-skill-code-deployment>; *Amazon Alexa Interface Reference*, AMAZON ALEXA DEVELOPER DOCUMENTATION (2023), available at: <https://developer.amazon.com/en-US/docs/alexa/device-apis/alexa-interface-reference.html>; Paul Socha, *Alexa Smart Properties enables audio and video calling between Echo and non-Echo devices with WebRTC*, AMAZON DEVELOPER BLOG (July 10, 2023), available at: <https://developer.amazon.com/en-US/blogs/alexa/alexa-skills-kit/2023/07/webrtc-alexa-launch-july-2023>; *Leveraging Amazon Chime Voice Connector for SIP Trunking*, AMAZON WHITEPAPER (April 2020); *Amazon Chime SDK, API Reference*, AMAZON CHIME DOCUMENTATION (2023); *Amazon Chime IAPI Reference Version 2018-05-01*, AMAZON CHIME DOCUMENTATION (2018); *AWS Black Belt Online Seminar – Amazon Chime*, AMAZON WEB SERVICES JAPAN YOUTUBE CHANNEL (December 10, 2019); available at: <https://www.youtube.com/watch?v=pVP075gme4o>; *AWS re:Invent 2020: Embed video conferencing in any app with the Amazon Chime SDK*, AWS EVENTS YOUTUBE CHANNEL (February 5, 2021), available at: <https://www.youtube.com/watch?v=XEFMhCtynKo>; *AWS Summit DC 2021: Blackboard delivers quality classes with Amazon Chime SDK*, AWS EVENTS YOUTUBE CHANNEL (February 5, 2021), available at: <https://www.youtube.com/watch?v=XEFMhCtynKo>.

Amazon user manuals, product support, marketing materials, and training materials to actively induce the users of the accused products to infringe the ‘105 patent. Accordingly, Amazon has induced and continues to induce users of the accused products to use the accused products in their ordinary and customary way to infringe the ‘105 patent, knowing that such use constitutes infringement of the ‘105 patent.

332. The ‘105 patent is well-known within the industry as demonstrated by multiple citations to the ‘105 patent in published patents and patent applications assigned to technology companies and academic institutions. Amazon is utilizing the technology claimed in the ‘105 patent without paying a reasonable royalty. Amazon is infringing the ‘105 patent in a manner best described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

333. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the ‘105 patent.

334. As a result of Amazon’s infringement of the ‘105 patent, Plaintiff has suffered monetary damages, and seek recovery in an amount adequate to compensate for Amazon’s infringement, but in no event less than a reasonable royalty for the use made of the invention by Amazon together with interest and costs as fixed by the Court.

COUNT IX
INFRINGEMENT OF U.S. PATENT NO. 8,255,551

335. Plaintiff references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

336. Amazon designs, makes, uses, sells, and/or offers for sale in the United States products comprising a technology for dynamically adapting audio and video bitrates based on TCP acknowledgments.

337. Amazon designs, makes, sells, offers to sell, imports, and/or uses the following products: Amazon Echo Show (Gen 1 and later), Amazon Chime, and Amazon Kinesis Video Streams (collectively, the “Amazon ‘551 Product(s)”).

338. One or more Amazon subsidiaries and/or affiliates use the Amazon ‘551 Products in regular business operations.

339. The Amazon ‘551 Products receive an optimal session bitrate through data received from TCP acknowledgments.

340. The Amazon ‘551 Products distribute the ideal session bitrate between audio and video streams, prioritizing either audio or video to achieve their respective optimal bitrates.

341. The Amazon ‘551 Products process both audio and video streams using their determined optimal bitrates for encoding.

342. The Amazon ‘551 Products combine the encoded audio and video streams into a single data stream.

343. The Amazon ‘551 Products deliver the combined audio and video data stream for transmission to a terminal device.

344. Amazon has directly infringed and continues to directly infringe the ‘551 patent by, among other things, making, using, offering for sale, and/or selling technology for dynamically adapting audio and video bitrates based on TCP acknowledgments, including but not limited to the Amazon ‘551 Products.

345. The Amazon ‘551 Products are available to businesses and individuals throughout the United States.

346. The Amazon ‘551 Products are provided to businesses and individuals located in this District.

347. By making, using, testing, offering for sale, and/or selling products and services comprising technology for dynamically adapting audio and video bitrates based on TCP acknowledgments, including but not limited to the Amazon ‘551 Products, Amazon has injured Plaintiff and is liable to Plaintiff for directly infringing one or more claims of the ‘551 patent, including at least claim 12 pursuant to 35 U.S.C. § 271(a).

348. Amazon also indirectly infringes the ‘551 patent by actively inducing infringement under 35 U.S.C. § 271(b).

349. Amazon has had knowledge of the ‘551 patent since at least service of this Complaint or shortly thereafter, and Amazon knew of the ‘551 patent and knew of its infringement, including by way of this lawsuit.

350. Alternatively, Amazon has had knowledge of the ‘551 patent since at least October 4, 2016, based on its citation of the ‘551 patent family as relevant prior art in seven patents and patent applications that are assigned to and owned by Amazon. These patents and patent applications include:

- U.S. Patent No. 10,104,140 (granted October 16, 2018)
- U.S. Patent No. 11,297,355 (granted April 5, 2022)
- U.S. Patent No. 11,343,551 (granted May 24, 2022)
- U.S. Patent No. 11,394,620 (granted July 19, 2022)
- U.S. Patent No. 11,659,212 (granted May 23, 2023)
- U.S. Patent Application No. 2017/0026438 (published January 26, 2017, granted October 16, 2018)
- U.S. Patent No. 9,462,019 (granted October 4, 2016)

351. Amazon intended to induce patent infringement by third-party customers and users of the Amazon ‘551 Products and had knowledge that the inducing acts would cause infringement or was willfully blind to the possibility that its inducing acts would cause infringement. Amazon specifically intended and was aware that the normal and customary use of the accused products would infringe the ‘551 patent. Amazon performed the acts that constitute induced infringement,

and would induce actual infringement, with knowledge of the ‘551 patent and with the knowledge that the induced acts would constitute infringement. For example, Amazon provides the Amazon ‘551 Products that have the capability of operating in a manner that infringe one or more of the claims of the ‘551 patent, including at least claim 12, and Amazon further provides documentation and training materials that cause customers and end users of the Amazon ‘551 Products to utilize the products in a manner that directly infringe one or more claims of the ‘551 patent.²³ By providing instruction and training to customers and end-users on how to use the Amazon ‘551 Products in a manner that directly infringes one or more claims of the ‘551 patent, including at least claim 12, Amazon specifically intended to induce infringement of the ‘551 patent. Amazon engaged in such inducement to promote the sales of the Amazon ‘551 Products, e.g., through Amazon user manuals, product support, marketing materials, and training materials to actively

²³ See e.g., *Amazon Kinesis Video Streams Developer Guide*, AMAZON AWS DOCUMENTATION (2023); *Connect your camera using Amazon Kinesis Video Streams for WebRTC in 10 minutes*, AWS IoT YOUTUBE CHANNEL (May 26, 2023), available at: <https://www.youtube.com/watch?v=8GZDmdBwVqU>; *AWS IoT and Amazon Kinesis Video Streams for Connected Home Applications*, AMAZON AWS PRESENTATION (August 16, 2020); *Alexa Smart Properties - Onboard and Implement Skill-Based WebRTC Calling for Alexa Smart Properties*, AMAZON ALEXA DEVELOPER DOCUMENTATION (2013), available at: <https://developer.amazon.com/en-US/docs/alexa/alexa-smart-properties/get-started-calling-api-for-asp.html>; Paul Socha, *Alexa Smart Properties: WebRTC skill code and deployment*, AMAZON DEVELOPER BLOG (August 1, 2023), available at: <https://developer.amazon.com/en-US/blogs/alexa/alexa-skills-kit/2023/08/alexa-smart-properties-webrtc-skill-code-deployment>; *Amazon Alexa Interface Reference*, AMAZON ALEXA DEVELOPER DOCUMENTATION (2023), available at: <https://developer.amazon.com/en-US/docs/alexa/device-apis/alexa-interface-reference.html>; Paul Socha, *Alexa Smart Properties enables audio and video calling between Echo and non-Echo devices with WebRTC*, AMAZON DEVELOPER BLOG (July 10, 2023), available at: <https://developer.amazon.com/en-US/blogs/alexa/alexa-skills-kit/2023/07/webrtc-alexa-launch-july-2023>; *Leveraging Amazon Chime Voice Connector for SIP Trunking*, AMAZON WHITEPAPER (April 2020); *Amazon Chime SDK, API Reference*, AMAZON CHIME DOCUMENTATION (2023); *Amazon Chime IAPI Reference Version 2018-05-01*, AMAZON CHIME DOCUMENTATION (2018); *AWS Black Belt Online Seminar – Amazon Chime*, AMAZON WEB SERVICES JAPAN YOUTUBE CHANNEL (December 10, 2019); available at: <https://www.youtube.com/watch?v=pVP075gme4o>; *AWS re:Invent 2020: Embed video conferencing in any app with the Amazon Chime SDK*, AWS EVENTS YOUTUBE CHANNEL (February 5, 2021), available at: <https://www.youtube.com/watch?v=XEFMhCtynKo>; *AWS Summit DC 2021: Blackboard delivers quality classes with Amazon Chime SDK*, AWS EVENTS YOUTUBE CHANNEL (February 5, 2021), available at: <https://www.youtube.com/watch?v=XEFMhCtynKo>.

induce the users of the accused products to infringe the ‘551 patent. Accordingly, Amazon has induced and continues to induce users of the accused products to use the accused products in their ordinary and customary way to infringe the ‘551 patent, knowing that such use constitutes infringement of the ‘551 patent.

352. The ‘551 patent is well-known within the industry as demonstrated by multiple citations to the ‘551 patent in published patents and patent applications assigned to technology companies and academic institutions. Amazon is utilizing the technology claimed in the ‘551 patent without paying a reasonable royalty. Amazon is infringing the ‘551 patent in a manner best described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

353. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the ‘551 patent.

354. As a result of Amazon’s infringement of the ‘551 patent, Plaintiff has suffered monetary damages, and seek recovery in an amount adequate to compensate for Amazon’s infringement, but in no event less than a reasonable royalty for the use made of the invention by Amazon together with interest and costs as fixed by the Court.

COUNT X
INFRINGEMENT OF U.S. PATENT NO. 10,412,388

355. Plaintiff references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

356. Amazon designs, makes, uses, sells, and/or offers for sale in the United States products comprising technology for video compression using adaptive re-quantization using extracted and derived quantization parameters.

357. Amazon designs, makes, sells, offers to sell, imports, and/or uses the following products: AWS Elastic Transcoder, AWS Elemental Live, AWS Elemental MediaConvert, and AWS Elemental Server (collectively, the “Amazon ‘388 Product(s)’”).

358. Amazon designs, makes, sells, offers to sell, imports, and/or uses Amazon ‘388 products that comply with the H.265 video encoding standard.

359. The Amazon ‘388 Products perform video processing compliant with the High Efficiency Video Coding (HEVC) standard, which is also often referred to as the H.265 standard. Specifically, the Amazon ‘388 products perform HEVC encoding.

360. One or more Amazon subsidiaries and/or affiliates use the Amazon ‘388 Products in regular business operations.

361. The Amazon ‘388 Products identify an initial quantization parameter employed to compress a previously decoded frame.

362. The Amazon ‘388 Products, as part of the encoding process use an initial quantization parameter (QP) for encoding each frame or coding unit (CU). In conforming to the HEVC standard, the Amazon ‘388 Products must set an initial QP value that serves as the baseline for encoding the decoded frame.

363. The Amazon ‘388 Products calculate a delta quantization parameter as influenced by the initial quantization parameter, where the function is designed to yield this delta parameter at least in part to achieve a bitrate reduction while sustaining a given quality threshold.

364. The Amazon ‘388 Products calculate a delta QP based on the initial quantization parameter. This function aims to minimize bitrate while retaining the required video quality.

365. The Amazon ‘388 Products ascertain a subsequent quantization parameter for the purpose of compressing the decoded frame, based on both the initial and delta quantization parameters.

366. The Amazon ‘388 Products determine a second quantization parameter using the initial QP and the delta QP. The Amazon ‘388 Products calculate the second quantization parameter as $QP1 + \Delta QP$. This second quantization parameter is the one used for encoding either the entire frame or specific coding units within the frame.

367. The Amazon ‘388 Products compress the decoded frame utilizing the second quantization parameter.

368. The Amazon ‘388 Products encode the video frames using the newly derived second quantization parameter.

369. By complying with the HEVC standard, the Amazon ‘388 Products necessarily infringe the ‘388 patent. Mandatory sections of the HEVC standard require the elements required by certain claims of the ‘388 patent, including but not limited to claim 1. High Efficiency Video Coding, Series H: Audiovisual And Multimedia Systems: Infrastructure Of Audiovisual Services – Coding Of Moving Video Rec. ITU-T H.265 (August 2021). The following sections of the HEVC Standard are relevant to Amazon’s infringement of the ‘388 patent: “7.3.2.2.3 Sequence parameter set screen content coding extension syntax;” “7.3.8.4 Coding quadtree syntax;” “7.3.8.14 Delta QP syntax;” “7.4.3.3.1 General picture parameter set RBSP semantics;” “7.4.7.1 General slice segment header semantics;” “7.4.9.14 Delta QP semantics;” “8.6.1 Derivation process for quantization parameters;” and “9.3.3.10 Binarization process for `cu_qp_delta_abs`.”

370. All implementations of the HEVC standard necessarily infringe the ‘388 patent as every implementation of the standard requires compliant devices to carry out the following: Each

frame or coding unit (CU) is encoded using a pre-defined initial Quantization Parameter (QP) which serves as a baseline for various optimizations. The standard mandates that a first QP (QP1) be identified before any encoding can occur. The Amazon '388 Products are, therefore, required to have mechanisms to set this initial QP1 for the to-be-encoded (or re-encoded) frame. Further, the HEVC standard sets out a structured way to adjust this initial QP based on a delta value. The objective of introducing a delta QP is generally to adapt to the complexity variations within a video sequence and to optimize rate-distortion performance. The HEVC encoding standard sets forth calculating a new QP (QP2) after determining the delta QP. This is done by adding the initial QP (QP1) and the delta QP. This step is essential for maintaining granular control over the rate-distortion tradeoff during encoding. Finally, the final encoding of the frame or CU takes place using QP2. The HEVC standard specifies that this is a requisite step for the encoding process to be considered compliant. The Amazon '388 Products must, therefore, encode frames using this newly computed QP2 to meet the standard's rate and quality stipulations.

371. Amazon has directly infringed and continues to directly infringe the '388 patent by, among other things, making, using, offering for sale, and/or selling technology for video compression using adaptive re-quantization using extracted and derived quantization parameters, including but not limited to the Amazon '388 Products.

372. The Amazon '388 Products are available to businesses and individuals throughout the United States.

373. The Amazon '388 Products are provided to businesses and individuals located in this District.

374. By making, using, testing, offering for sale, and/or selling products and services comprising technology for video compression using adaptive re-quantization using extracted and

derived quantization parameters, including but not limited to the Amazon ‘388 Products, Amazon has injured Plaintiff and is liable to Plaintiff for directly infringing one or more claims of the ‘388 patent, including at least claim 1 pursuant to 35 U.S.C. § 271(a).

375. Amazon also indirectly infringes the ‘388 patent by actively inducing infringement under 35 U.S.C. § 271(b).

376. Amazon has had knowledge of the ‘388 patent since at least service of this Complaint or shortly thereafter, and Amazon knew of the ‘388 patent and knew of its infringement, including by way of this lawsuit.

377. Amazon intended to induce patent infringement by third-party customers and users of the Amazon ‘388 Products and had knowledge that the inducing acts would cause infringement or was willfully blind to the possibility that its inducing acts would cause infringement. Amazon specifically intended and was aware that the normal and customary use of the accused products would infringe the ‘388 patent. Amazon performed the acts that constitute induced infringement, and would induce actual infringement, with knowledge of the ‘388 patent and with the knowledge that the induced acts would constitute infringement. For example, Amazon provides the Amazon ‘388 Products that have the capability of operating in a manner that infringe one or more of the claims of the ‘388 patent, including at least claim 1, and Amazon further provides documentation and training materials that cause customers and end users of the Amazon ‘388 Products to utilize the products in a manner that directly infringe one or more claims of the ‘388 patent.²⁴ By

²⁴ See e.g., *MediaLive User Guide*, AMAZON DOCUMENTATION (2023); *AWS Elemental MediaLive API Reference*, AMAZON DOCUMENTATION (2023); *AWS re:Invent 2020: Live content production on the AWS Cloud*, AWS EVENTS YOUTUBE CHANNEL (February 5, 2023), available at: <https://www.youtube.com/watch?v=Ed1pz83FlrQ>; *AWS Elemental MediaConvert User Guide*, AMAZON DOCUMENTATION (2023); *Automated Media Workflows in the Cloud (MED304) | AWS re:Invent 2013*, AMAZON WEB SERVICES YOUTUBE CHANNEL (November 29, 2013), available at: <https://www.youtube.com/watch?v=5Wb9uS0FKNg>; *AWS Elemental MediaLive API Reference*, AMAZON DOCUMENTATION (2023); *File-based transcoding using Automated ABR Configuration with AWS Elemental MediaConvert*, AWS for Media & Entertainment (June 7, 2022); available

providing instruction and training to customers and end-users on how to use the Amazon ‘388 Products in a manner that directly infringes one or more claims of the ‘388 patent, including at least claim 1, Amazon specifically intended to induce infringement of the ‘388 patent. Amazon engaged in such inducement to promote the sales of the Amazon ‘388 Products, e.g., through Amazon user manuals, product support, marketing materials, and training materials to actively induce the users of the accused products to infringe the ‘388 patent. Accordingly, Amazon has induced and continues to induce users of the accused products to use the accused products in their ordinary and customary way to infringe the ‘388 patent, knowing that such use constitutes infringement of the ‘388 patent.

378. The ‘388 patent is well-known within the industry as demonstrated by multiple citations to the ‘388 patent in published patents and patent applications assigned to technology companies and academic institutions. Amazon is utilizing the technology claimed in the ‘388 patent without paying a reasonable royalty. Amazon is infringing the ‘388 patent in a manner best described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

379. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the ‘388 patent.

380. As a result of Amazon’s infringement of the ‘388 patent, Plaintiff has suffered monetary damages, and seek recovery in an amount adequate to compensate for Amazon’s infringement, but in no event less than a reasonable royalty for the use made of the invention by Amazon together with interest and costs as fixed by the Court.

at: <https://www.youtube.com/watch?v=QMs7fFKHPQw>; *Amazon Elastic Transcoder Developer Guide API Version 2012-09-25*, AMAZON DOCUMENTATION (September 9, 2012); and *AWS Webcast - What's New with Amazon Elastic Transcoder*, AMAZON WEB SERVICES YOUTUBE CHANNEL (July 26, 2013); available at: <https://www.youtube.com/watch?v=dI2PMRULGaA>.

COUNT XI
INFRINGEMENT OF U.S. PATENT NO. 9,167,021

381. Plaintiff references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

382. Amazon designs, makes, uses, sells, and/or offers for sale in the United States products comprising technology for HTTP transaction analysis for web browsing session segmentation.

383. Amazon designs, makes, sells, offers to sell, imports, and/or uses Amazon CloudWatch Real User Monitoring (RUM) (the “Amazon ‘021 Product”).

384. One or more Amazon subsidiaries and/or affiliates use the Amazon ‘021 Product in regular business operations.

385. The Amazon ‘021 Product captures an ongoing Hypertext Transfer Protocol (HTTP) interaction.

386. The Amazon ‘021 Product ascertains if the active HTTP interaction is associated with web browsing.

387. The Amazon ‘021 Product analyzes the “User-Agent” string within HTTP headers to distinguish between various types of HTTP traffic. This includes differentiating between actual web browsers and, for example, API requests or bots.

388. The Amazon ‘021 Product retrieves a historical set of transactions for a designated client.

389. The Amazon ‘021 Product employs browser cookies, LocalStorage, and server-side session IDs to store and fetch a historical set of transactions specific to a client.

390. The Amazon ‘021 Product assesses if the active HTTP interaction is related to the archived set of transactions for that client.

391. The Amazon '021 Product employs sequence pattern recognition to understand whether a current HTTP transaction logically fits within a set of prior transactions.

392. The Amazon '021 Product, upon confirming the active HTTP interaction's relation to the historical set, incorporates the current interaction into that set.

393. Upon determining that a transaction is related to the prior set, the Amazon '021 Product updates its data structures to include the new transaction as a part of the existing set. This involves manipulating data objects that contain HTTP transactions as properties or list elements.

394. When the active HTTP interaction is deemed unrelated to the historical transaction set, the Amazon '021 Product delineates a page unit comprising the archived HTTP interactions for the purpose of calculating page unit time.

395. In cases where a transaction is evaluated as not belonging to the current set, a 'page boundary' is created by the Amazon '021 Product. This boundary serves as a cutoff for metrics calculations like average time spent on a page or session.

396. Amazon has directly infringed and continues to directly infringe the '021 patent by, among other things, making, using, offering for sale, and/or selling technology comprising HTTP transaction analysis for web browsing session segmentation, including but not limited to the Amazon '021 Product.

397. The Amazon '021 Product is available to businesses and individuals throughout the United States.

398. The Amazon '021 Product is provided to businesses and individuals located in this District.

399. By making, using, testing, offering for sale, and/or selling products and services comprising technology for HTTP transaction analysis for web browsing session segmentation,

including but not limited to the Amazon ‘021 Product, Amazon has injured Plaintiff and is liable to Plaintiff for directly infringing one or more claims of the ‘021 patent, including at least claim 1 pursuant to 35 U.S.C. § 271(a).

400. Amazon also indirectly infringes the ‘021 patent by actively inducing infringement under 35 U.S.C. § 271(b).

401. Amazon has had knowledge of the ‘021 patent since at least service of this Complaint or shortly thereafter, and Amazon knew of the ‘021 patent and knew of its infringement, including by way of this lawsuit.

402. Amazon intended to induce patent infringement by third-party customers and users of the Amazon ‘021 Product and had knowledge that the inducing acts would cause infringement or was willfully blind to the possibility that its inducing acts would cause infringement. Amazon specifically intended and was aware that the normal and customary use of the accused product would infringe the ‘021 patent. Amazon performed the acts that constitute induced infringement, and would induce actual infringement, with knowledge of the ‘021 patent and with the knowledge that the induced acts would constitute infringement. For example, Amazon provides the Amazon ‘021 Product that has the capability of operating in a manner that infringe one or more of the claims of the ‘021 patent, including at least claim 1, and Amazon further provides documentation and training materials that cause customers and end users of the Amazon ‘021 Product to utilize the product in a manner that directly infringes one or more claims of the ‘021 patent.²⁵ By providing

²⁵ See e.g., *Amazon CloudWatch User Guide*, AMAZON DOCUMENTATION (2023); Jeff Barr, *Real-User Monitoring for Amazon CloudWatch*, AWS NEWS BLOG (November 29, 2021), available at: <https://aws.amazon.com/blogs/aws/cloudwatch-rum/>; *AWS Prescriptive Guidance Logging and monitoring guide for application owners*, AWS WHITEPAPER (2023); *Amazon CloudWatch RUM – AWS Black Belt Online Seminar*, AMAZON WEB SERVICES JAPAN YouTube Channel (May 12, 2023), available at: <https://www.youtube.com/watch?v=gdG0bhxgR2w>; Rahul Goyal, *Do you really know what happens with your applications?*, AWS PRESENTATION (2022); and *AWS re:Invent 2021 - Optimize applications through end user insights with Amazon CloudWatch RUM*,

instruction and training to customers and end-users on how to use the Amazon ‘021 Product in a manner that directly infringes one or more claims of the ‘021 patent, including at least claim 1, Amazon specifically intended to induce infringement of the ‘021 patent. Amazon engaged in such inducement to promote the sales of the Amazon ‘021 Product, e.g., through Amazon user manuals, product support, marketing materials, and training materials to actively induce the users of the accused product to infringe the ‘021 patent. Accordingly, Amazon has induced and continues to induce users of the accused product to use the accused product in its ordinary and customary way to infringe the ‘021 patent, knowing that such use constitutes infringement of the ‘021 patent.

403. The ‘021 patent is well-known within the industry as demonstrated by multiple citations to the ‘021 patent in published patents and patent applications assigned to technology companies and academic institutions. Amazon is utilizing the technology claimed in the ‘021 patent without paying a reasonable royalty. Amazon is infringing the ‘021 patent in a manner best described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

404. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the ‘021 patent.

405. As a result of Amazon’s infringement of the ‘021 patent, Plaintiff has suffered monetary damages, and seek recovery in an amount adequate to compensate for Amazon’s infringement, but in no event less than a reasonable royalty for the use made of the invention by Amazon together with interest and costs as fixed by the Court.

AWS EVENTS YOUTUBE CHANNEL (December 16, 2021), available at: <https://www.youtube.com/watch?v=NMaeujY9A9Y>.

COUNT XII
INFRINGEMENT OF U.S. PATENT NO. 10,362,081

406. Plaintiff references and incorporates by reference the preceding paragraphs of this Complaint as if fully set forth herein.

407. Amazon designs, makes, uses, sells, and/or offers for sale in the United States products comprising technology for network quality of experience (QoE) analytics and optimization.

408. Amazon designs, makes, sells, offers to sell, imports, and/or uses the following products: Amazon Interactive Video Service (IVS) Real-Time Streaming and Amazon IVS Low-Latency Streaming (collectively, the “Amazon ‘081 Product(s)”).

409. One or more Amazon subsidiaries and/or affiliates use the Amazon ‘081 Products in regular business operations.

410. The Amazon ‘081 Products collect data from multimedia streams traversing a network.

411. The Amazon ‘081 Products gather relevant metrics linked to the acquired multimedia data, which include, but aren’t limited to, metrics for multimedia transmission and multimedia quality. These metrics for multimedia transmission incorporate a smoothness index, calculated based on stalling time and media time, where stalling time indicates the discrepancy between the actual playback time and the media time.

412. The Amazon ‘081 Products acquire metrics associated with the multimedia data that is transmitted. The metrics that are gathered include round-trip time, jitter, and/or packet loss rate. Further, the Amazon ‘081 Products calculate a smoothness index. This index is determined by employing stalling time and media time. Stalling time can be measured by timestamps,

essentially tracking buffering events and their durations. Media time is the actual playback time, and their difference gives a measure of how ‘smooth’ the multimedia experience is.

413. The Amazon ‘081 Products standardize these gathered metrics for uniform assessment.

414. The Amazon ‘081 Products apply normalization to the metrics to ensure the metrics are on a comparable scale.

415. The Amazon ‘081 Products evaluate a composite set of Quality of Experience (QoE) metrics rooted in these normalized metrics.

416. Upon normalization, the Amazon ‘081 Products calculate composite QoE metrics. The composite QoE score calculated by the Amazon ‘081 Products serve as a metric for multimedia quality.

417. The Amazon ‘081 Products output one or more rule sets for traffic management optimization.

418. The Amazon ‘081 Products generate optimization rules for traffic management based on these composite QoE metrics. These rules are directed to improving the end-user’s multimedia experience.

419. Amazon has directly infringed and continues to directly infringe the ‘081 patent by, among other things, making, using, offering for sale, and/or selling technology for network quality of experience (QoE) analytics and optimization, including but not limited to the Amazon ‘081 Products.

420. The Amazon ‘081 Products are available to businesses and individuals throughout the United States.

421. The Amazon '081 Products are provided to businesses and individuals located in this District.

422. By making, using, testing, offering for sale, and/or selling products and services comprising technology for network quality of experience (QoE) analytics and optimization, including but not limited to the Amazon '081 Products, Amazon has injured Plaintiff and is liable to Plaintiff for directly infringing one or more claims of the '081 patent, including at least claim 1 pursuant to 35 U.S.C. § 271(a).

423. Amazon also indirectly infringes the '081 patent by actively inducing infringement under 35 U.S.C. § 271(b).

424. Amazon has had knowledge of the '081 patent since at least service of this Complaint or shortly thereafter, and Amazon knew of the '081 patent and knew of its infringement, including by way of this lawsuit.

425. Amazon intended to induce patent infringement by third-party customers and users of the Amazon '081 Products and had knowledge that the inducing acts would cause infringement or was willfully blind to the possibility that its inducing acts would cause infringement. Amazon specifically intended and was aware that the normal and customary use of the accused products would infringe the '081 patent. Amazon performed the acts that constitute induced infringement, and would induce actual infringement, with knowledge of the '081 patent and with the knowledge that the induced acts would constitute infringement. For example, Amazon provides the Amazon '081 Products that have the capability of operating in a manner that infringe one or more of the claims of the '081 patent, including at least claim 1, and Amazon further provides documentation and training materials that cause customers and end users of the Amazon '081 Products to utilize

the products in a manner that directly infringe one or more claims of the ‘081 patent.²⁶ By providing instruction and training to customers and end-users on how to use the Amazon ‘081 Products in a manner that directly infringes one or more claims of the ‘081 patent, including at least claim 1, Amazon specifically intended to induce infringement of the ‘081 patent. Amazon engaged in such inducement to promote the sales of the Amazon ‘081 Products, e.g., through Amazon user manuals, product support, marketing materials, and training materials to actively induce the users of the accused products to infringe the ‘081 patent. Accordingly, Amazon has induced and continues to induce users of the accused products to use the accused products in their ordinary and customary way to infringe the ‘081 patent, knowing that such use constitutes infringement of the ‘081 patent.

426. The ‘081 patent is well-known within the industry as demonstrated by multiple citations to the ‘081 patent in published patents and patent applications assigned to technology companies and academic institutions. Amazon is utilizing the technology claimed in the ‘081 patent without paying a reasonable royalty. Amazon is infringing the ‘081 patent in a manner best described as willful, wanton, malicious, in bad faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate.

427. To the extent applicable, the requirements of 35 U.S.C. § 287(a) have been met with respect to the ‘081 patent.

²⁶ See e.g., *Amazon Interactive Video Service Low-Latency Streaming User Guide*, AMAZON DOCUMENTATION (2023); *AWS On Air ft. Introducing Real-Time Streaming with Amazon IVS*, AWS EVENTS YOUTUBE CHANNEL (September 5, 2023), available at: <https://www.youtube.com/watch?v=-xiwrx-g01Q>; *Amazon IVS Low-Latency Streaming API Reference API Version 2020-07-14*, AMAZON DOCUMENTATION (July 14, 2020); and *AWS for M&E Video Tutorials: Monitoring and Key Metrics for Amazon Interactive Video Service*, AWS FOR MEDIA & ENTERTAINMENT (February 17, 2022), available at: <https://www.youtube.com/watch?v=LnRDJOxLoiw>; *Amazon IVS Real-Time Streaming User Guide*, AMAZON DOCUMENTATION (2023).

428. As a result of Amazon's infringement of the '081 patent, Plaintiff has suffered monetary damages, and seek recovery in an amount adequate to compensate for Amazon's infringement, but in no event less than a reasonable royalty for the use made of the invention by Amazon together with interest and costs as fixed by the Court.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff OptiMorphix, Inc. respectfully requests that this Court enter:

- A. A judgment in favor of Plaintiff that Amazon has infringed, either literally and/or under the doctrine of equivalents, the '273, '418, '314, '353, '871, '559, '285, '105, '551, '388, '021, and '081 patents;
- B. An award of damages resulting from Amazon's acts of infringement in accordance with 35 U.S.C. § 284;
- C. A judgment and order finding that Amazon's infringement was willful, wanton, malicious, bad-faith, deliberate, consciously wrongful, flagrant, or characteristic of a pirate within the meaning of 35 U.S.C. § 284 and awarding to Plaintiff enhanced damages.
- D. A judgment and order finding that this is an exceptional case within the meaning of 35 U.S.C. § 285 and awarding to Plaintiff reasonable attorneys' fees against Amazon.
- E. Any and all other relief to which Plaintiff may show themselves to be entitled.

JURY TRIAL DEMANDED

Pursuant to Rule 38 of the Federal Rules of Civil Procedure, Plaintiff OptiMorphix, Inc. requests a trial by jury of any issues so triable by right.

Dated: February 16, 2024

Respectfully submitted,

/s/ Daniel P. Hipskind

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CERTIFICATE OF SERVICE

The undersigned counsel hereby certifies that on February 16, 2024, a copy of the foregoing document was served on all counsel who have appeared in this case via email.

/s/ Daniel P. Hipskind
Daniel P. Hipskind